THE IRON AGE

THE NATIONAL METALWORKING WEEKLY

November 23, 1950

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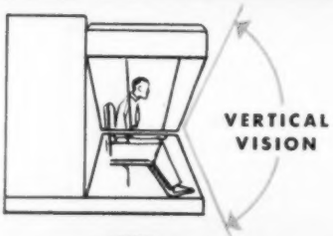

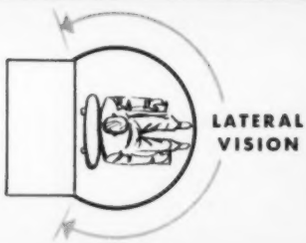

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THE IRON AGE

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November 23, 1950 • • • Vol. 166, No. 21

Special Article

Conventional classification of heat-treated, high-strength steels according to hardenability is incomplete. Static and notch bar characteristics of high-strength steels reveal relationships between strength and ductility, chemistry and structure.—p. 59.

Issue Highlights

A knowledge of functions of the many different types of resistance welding controls available helps select the least expensive control consistent with requirements of a given job.—p. 64.

Featuring ultimate flexibility, is a new portable hydraulic shear, weighing only 38 lb, which can be suspended from a crane hook. The shear will cut rod up to 1 1/16 in. in diam and wire cable up to 3½ in. diam.—p. 74.

The steel industry is quietly raising its coke oven capacity to keep pace with actual and contemplated expansion in iron and steel capacity. The 9.4 million ton expansion reported to Secretary of Commerce Sawyer is now seen as conservative.—p. 79.

Ben Fairless, president of U. S. Steel Corp., and Armco Steel Corp. chairman Charles R. Hook made speeches last week that described a price increase in steel as inevitable. Both men saw the industry as constantly expanding.—p. 81.

Republic Steel Corp. disclosed a blueprint of expansion that will add 672,000 ingot tons to its steelmaking capacity in the Cleveland District. Faster write-offs of plants producing for defense was cited as a prime motivation.—p. 82.

Republic Aviation Corp. has developed for the Air Force a time and money saving optical system for building large fixtures and jigs. The method is based on use of a light beam as a reference plane to locate points on a structure. —p. 83.

With the Nov. 15 deadline for filing DO orders out of the way, mills have a clearer picture of what's in store for their customers in early 1951. The 45-day lead time on DO orders has caused producers to switch to a month-to-month quota basis.—p. 84.

Coming Next Week

The sigma phase is still a confused subject. Further classification of some of the misunderstandings about sigma is contained in Part I of a two-part article.

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Editorial

INDUSTRY VIEWPOINTS

The Indispensable Man

REGARDLESS of the election, Korea or any other factor—such as the wishful thinking that we can come to logical terms with Russia—the United States is at the crossroads.

Even the most peace loving people should have found out by now that Russia hopes to rule the world; and that appeasement is one of her weapons.

No one likes the defense program. Each of us would like something in its place. Something like the good old 20's.

Our government has been trying to get top level people for important defense jobs. A thundering silence has met many pleas.

Finding fault with people who try to serve their government always reaches new peaks in times like these—even when the real culprits are the politicians who make the policies and don't do the shovel work.

Mr. Truman and Congress have been stubborn about dollar-a-year men—people who get their salary from their company. Most dollar-a-year candidates have responsibilities which government pay will not discharge.

All this does not change the fact that the free world is closer to annihilation through war, inflation, or a lost cause than it has ever been. The Communists sell their bill of goods.

Right or wrong, Communist soldiers have a crazy way of dying by the millions for a cause we don't believe in. Their leaders—the Moscow international bandits—have no feeling whatever for human life. They never did have. Nor do their puppets in satellite countries.

Invitations by the score have gone to business people to take key defense jobs. Many have been turned down for what those invited thought to be good and sufficient reasons.

If government cannot get the caliber of men needed, the job will suffer. Then business will complain that things are not going right. What can you expect if we haven't enough Americans with seasoned experience who find it in their hearts or pocketbooks to serve their government?

There are good reasons why many can't serve. But let's explode this myth of the indispensable man. There is no man living who is indispensable—obituary columns prove this.

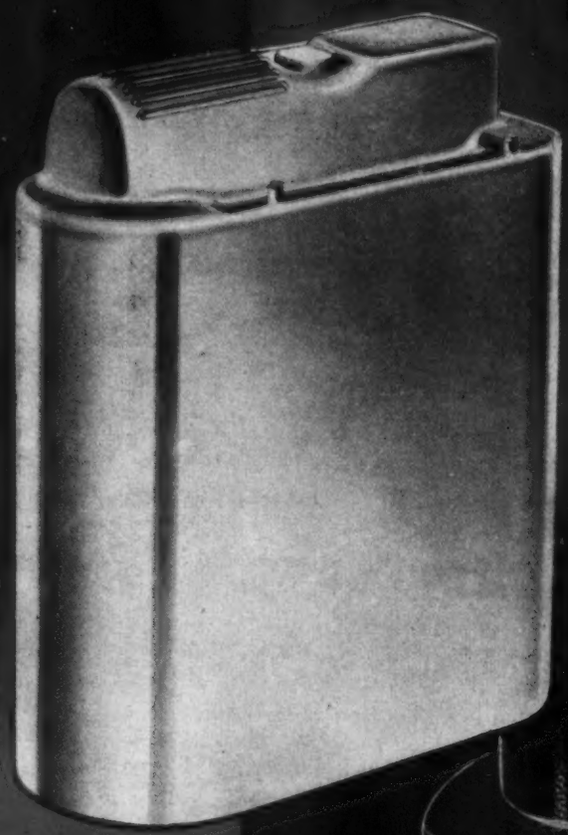
The time may come when businessmen will not have the chance to serve. The time may even come when we will not have those things which most of us take for granted; instead of with some sense of humility and thankfulness.

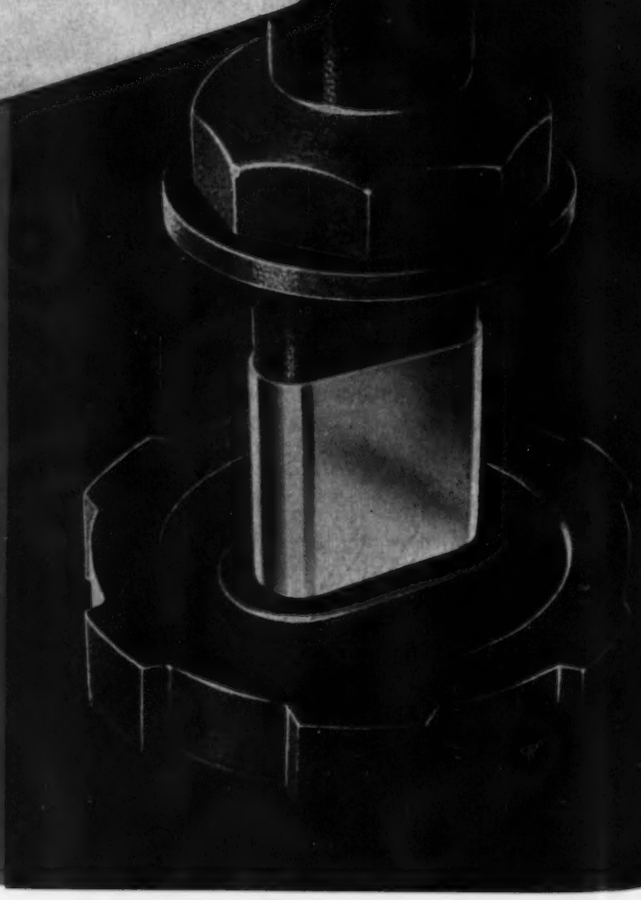
We are sitting on a powder keg. The fuse may be long but it's burning.

Tom C. Campbell

Editor

ONE-PUNCH PRODUCTION means . . .





Here's what we mean by One-Punch Production

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PUNCH WHAMS DOWN ON SLUG

FASTER THAN SIGHT, METAL FLOWS UP PUNCH

PART IS READY FOR FURTHER FINISHING OR ASSEMBLY

NEWSFRONT

NEWS, METHODS AND PRODUCT FORECAST

► It will be some time before machine tools get full priorities or allocations from Washington unless government planning agencies change their minds. In the meantime NPA will give priority relief only in individual hardship cases. But delivery dates are stretching out and pressure for machines for arms work is mounting.

► Among growing military applications of titanium are base plates for 81-mm mortars. The weight saving will be a big boon to GI's who have to handle this heavy equipment.

► The Interior Dept. is now planning a program to allocate materials for cable and other major equipment for the electric utility industry. Manufacturers will soon be called to Washington to help lay out the setup.

► Military men have learned a lesson from World War II procurement. This time the policy will be to demand material on schedule—rather than all at once as some did in 1941-1942.

► Insiders in New York financial circles report existence of a $500 million "forward position" in sterling; meaning that there's this much money betting that the British pound will be revalued upward. But a lot of smart money is staying out of this market.

► At the request of the Munitions Board, airframe manufacturers are studying standardization of certain hole locations on drawing presses to permit shipping dies from plant to plant without reworking the dies. General Motors has had its suppliers working on press standardization but some of the proposals were economically impractical.

► Rumors of coming automobile production cutbacks are abundant. A large independent producer is planning a substantial cut in release to suppliers in December with further cuts in the first quarter.

► Glass-reinforced compression molded plastic parts have been made with a tensile strength of better than 100,000 psi. They have correspondingly high impact resistance (3 pct elongation) and are a good bet for many fairly highly stressed parts.

► Hot rolling of turbine bucket blades is being tried. If successful, this method will replace forging of some types of high temperature alloys. In forging, the initial slug is a rod; in rolling, a T-shaped slug is cut from heavy plate.

► An automobile brake operated by pushing a button on the steering wheel is being developed at Rensselaer Polytechnic Institute. Braking fluid consisting of a mixture of oil and iron particles turns progressively solid as it is energized by passage of an electric current but returns to a fluid when current flow stops.

► Insect proof wool uniforms will soon be made for the Army to cut damage in storage. There is now on the market a flameproofing treatment that would increase protection against phosphorus shells; incidentally, it is also mildew-proof.

► A new pilot plant for producing titanium will soon be announced. The method is electrolytic and employs 4000 amp dc current to deposit titanium on the cathode. Big problem now is leaching of the salts from the cathode.

Steel Labor Agreement Near

Price Boosts Coming, Too

Expect Huge Civilian Cuts

The Iron Age SUMMARY

IRON AND STEEL INDUSTRY TRENDS

THE steel wage negotiations were hot this week—by remote control. Even though the meetings were adjourned, contact between management and labor heads was kept open.

The break in the wage-price picture may come this week. One thing is sure—if wages go up steel prices will go up too.

There was nothing in late reports which changed THE IRON AGE's previous estimate of a 15¢ to 17¢ an hr increase with chances strong for the top side.

As to prices, steel firms could not possibly absorb wage increases now being negotiated, so the estimate of $6 to $10 a ton raise with the probability towards the high side still stands. Accumulated increased costs exclusive of a wage increase already run to $4 a ton with most steel firms—and more with others.

Civilian Steel Cutbacks—30 to 50 Pct

Steel orders of civilian consumers will be cut back 30 to 50 pct during the first quarter of next year. Steel producers have decided the cutbacks will be necessary because of (1) Defense orders, (2) essential civilian orders and (3) heavy carryover of orders from fourth quarter of this year.

The amount of cutbacks will vary among products and producers. In adding up known requirements mills can estimate carryovers fairly accurately. They are also setting aside the maximum on each product which they must accept for DO orders, although they expect these limits will have to be raised in the near future. Their estimates on tonnage needed for essential civilian programs will also have to be raised as more programs are approved.

What this means is that regular customers without the magic, numbered priority orders will soon be getting 30 to 50 pct less steel. And new customers won't stand a ghost of a chance of getting on order books without government help or utter benevolence of a steel producer.

Steel people still have to estimate the essential requirements which they will be called upon to fill. As things stand now there is no definite indication from the government or the military as to what will be required for defense of essential civilian programs for any given future period.

Creeping Controls Become Trot

Steel people don't understand why military departments have not determined what they need and what they can buy within the limits of funds alloted by Congress; even an approximate figure would be better than the piecemeal way controls are being placed on steel distribution. These creeping controls are now turning into a trot. No one can know where he stands until requirements become known and are matched against production.

Meanwhile, steel people are estimating as best they can the tonnage needed for the various programs. They are matching this against output. Then they are re-examining historical and potential needs of their customers with the aim of distributing the remaining steel fairly.

DO Orders Tough to Place

Customers are already trying to place DO orders faster than the mills are required to accept them. One large producer has already booked DO's for cold-rolled sheets up to the maximum he is required to accept for the next 4 months. A stainless producer says that 40 to 50 pct of the orders coming across his desk are directly or indirectly for the jet program. There is evidence that some customers are having trouble placing DO orders because (1) mills contacted are booked up to DO limits or (2) they don't know how to place the orders.

Steelmaking operations this week are again scheduled at 103 pct of rated capacity.

(Nonferrous summary, p. 96)

Fatigue Cracks

By CHARLES T. POST

Business Assignment

George Elwers, your f.f.j.'s handsome machinery editor, got around to attending Michael Todd's "Peep Show" the other night. "Peep Show," in case you hadn't heard, is a modern-day cross between Ziegfeld's follies and burlesque.

From his fifth row seat, George was fascinated when a stage-version lift truck with a 25-ft boom picked up one of the chorus cuties and swung her out over the audience. Immediately, he was all business, attempting to find out whether the equipment was adapted from a commerical model. (It wasn't.)

Back at the office, he put the price of the tickets on his expense account, claiming he was covering a materials handling demonstration. The auditor, the old meanie, refused to okay it. Said the gal was not commercial material.

Black Market

Readers of Chester Gould's "Dick Tracy" comic strip have been deluging your favorite family journal with telephone calls. Last week the current villain of the strip, one T. V. Wiggles, was crushed beneath 5 tons of steel sheets in a warehouse where he had taken refuge. The callers want to know where Gould found the 5 tons of sheets.

Progress

Evans Jasper, vice-president of Manco Mfg. Co., wasn't being personal, we're sure, in calling attention to this jingle by William Erskine:

This house where once a lawyer dwelt
Is now a smith's, alas,
How rapidly the iron age
Succeeds the age of brass!

Puzzlers

The international difference of opinion on the length of the diagonal board in the September problem has been straightened out. M. A. E. Denis, chief of the Iron and Steel Div., French Ministry of Commerce, writes that he used a wrong dimension in his original calculations and withdraws his objection to the printed answer.

To bring you up to date, Theodore Gade of Catskill, N. Y., solved that one, too. J. S. Prifogle, Belden Mfg. Co., checked in on the counterfeit bill puzzler and the circular printing problem. The inclination of the plate resting on three balls was no problem to C. E. Blass of Talon or B. B. Hood of Falls Church, Va., although it stumped some others. R. W. Huff of Republic writes that his high school sophomore son solved the circular-printing problem. And we have correct answers on the tire dealer from Robert D. McGrail, National Tube Co.; Bob Alvis, T.C.I. & R.R. Co.; H. E. Freund, Talon, Inc.; Robert F. Feland, Jr., Applied Research Laboratories; Albert D. Stave, Stave Bros.; R. Clarence Gray, The Gray Wire Specialty Co.; S. B. Knutson, National Electric Products Corp.; T. R. Eggert, Steel Founders' Society; Arthur W. Viner, Committee for Economic Development; and two feminine readers, Miss Janet C. Morrison of New York and Miss Jessie Thornton of Sharon, Pa.

Arthur A. Coffin, Jr., doesn't know the answer to this one and neither do we: A drum 60 in. long and 27 in. diameter, filled with oil, is lying on its side. It is tipped up to a 30° angle and the oil is allowed to drain out until the oil reaches a level that is 17 in. above the ground. How much oil remains in the drum?

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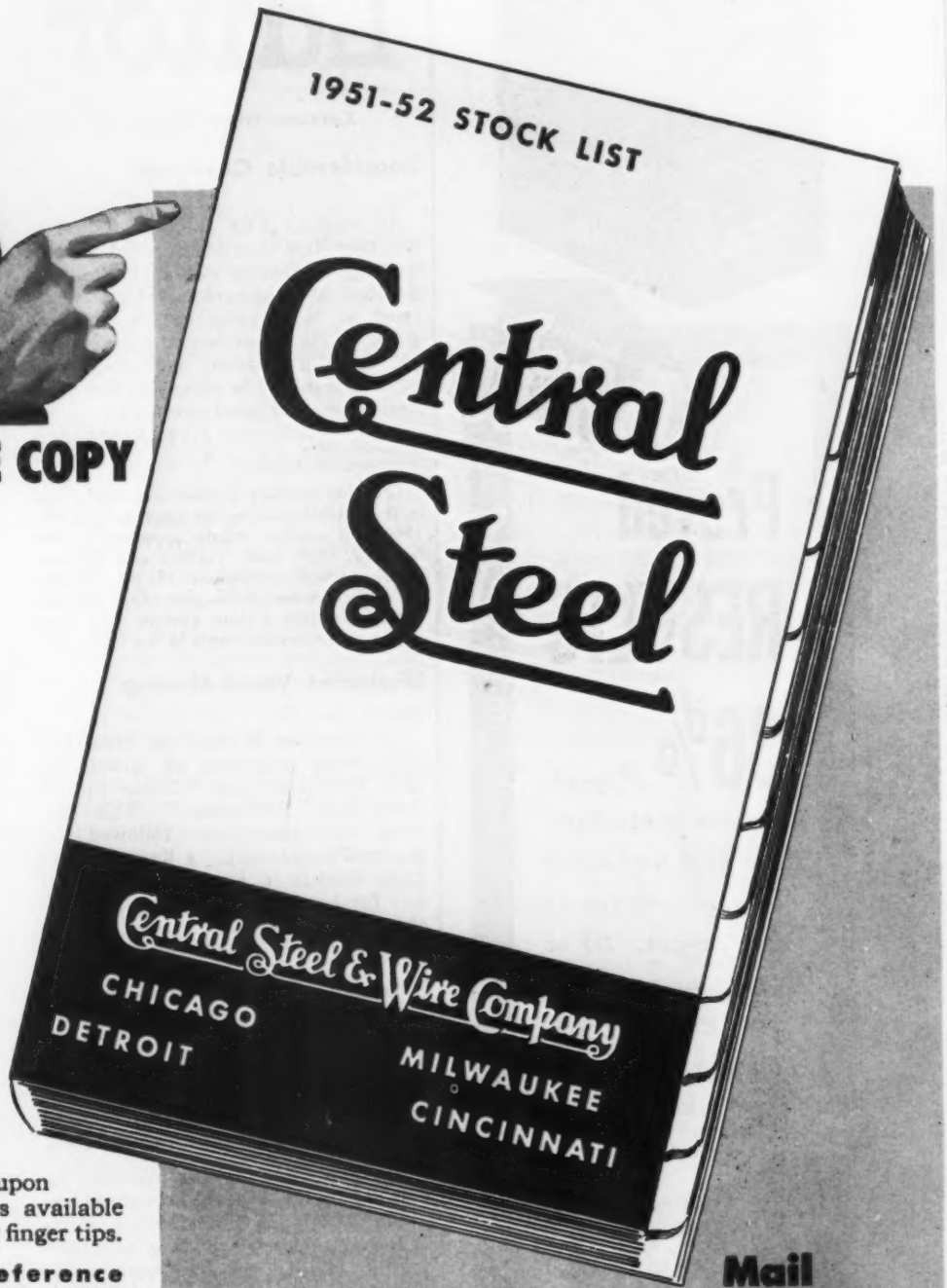

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Dear Editor

Letters from Readers

Considerable Coverage

Sir:

In reading THE IRON AGE during the past few months, I noted a cold welding process as was used in either Sweden or Denmark. I have since tried to locate this article without success. Therefore, would you send us all the information including any tools that might be necessary for both production and hand operation.

E. Y. HOWELL
Algonac Mfg. Co.
Algonac, Michigan

The cold welding process was written up in THE IRON AGE as far back as Aug. 19, 1948, and another article appeared in the Nov. 10, 1949, issue. Fortune and Business Week carried discussions of the process during September of this year. Our Oct. 26, 1950, issue had a story dealing with some of the latest developments in the field.—Ed.

Eliminates Wood Mockup

Sir:

In the June 29 issue of THE IRON AGE, there appeared an article by G. F. Elwers entitled "Plastics Speeds Auto Body Production." This covered the operations followed by Kaiser-Frazer Corp. I have a letter from friends in England asking for any further details that may be available on the process.

E. T. KLEE
Detroit

The company concerned with this development might be the best source for more comprehensive information. Address inquiries to William Springer, Kaiser-Frazer Corp., Willow Run, Mich.—Ed.

Help Wanted

Sir:

We are planning an addition to, and a complete rearrangement of our manufacturing facilities. Our desire is to have the most efficient manufacturing facility possible within the limits of our buildings and the requirements of our products. We are working on the layouts at this time and expect to have our decisions crystalized and on paper within the next 30 days. It is our desire to have the best layout man available come in and go over our proposal with us to make certain that we have taken advantage of every possible factor which would fit our manufacturing problems and tend to improve efficiency.

It would be appreciated if you would, from your wide experience and contacts, put us in touch with one or more men who would be capable of doing this job for us. As you know, we manufacture a number of precision photographic products in relatively small volume. Therefore, the man must be familiar with this type of work and the inherent problems connected with it. It is expected that this man would spend from one to four weeks on this project.

R. L. CHYRCHEL
Works Manager
Bell & Howell Co.
Chicago

Readers interested in this project should contact Mr. Chyrchel at Bell & Howell Co., 7100 McCormick Road, Chicago 45.—Ed.

"Prize in Every Pack—"

Sir:

I have mentioned to you a number of times how much I thought of your editorials, and this is just a word to say the one of Nov. 2, "They Are At It Again," is a crackerjack.

W. W. SEBALD
President
Armco Steel Corp.
Middletown, Ohio

Literature Search

Sir:

Have you any information on a European alloy known as NCT-3.

G. C. WHEELER
Engineering Dept.
North American Philips Co., Inc.
Lewiston, Maine

NCT-3 is called "Nicrotherm," a 25 pct chromium, 20 pct nickel, heat and corrosion resistant alloy for service up to 1200°F. It was produced by Krupp Steel Works, Essen, Germany. The American agent is Thomas Prosser & Son, 120 Wall St., New York, N. Y. It is discussed in Woldman and Metzler's "Engineering Alloys," published by ASM. —Ed.

One Year Late

Sir:

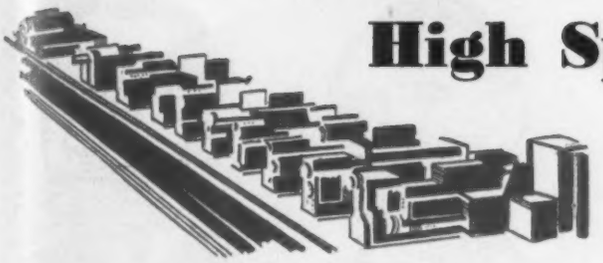
Your Oct. 5 issue has a short article entitled "Washington Moves on Faster Depreciation." The last sentence of par. 4, states "However, the plant or facilities for which the tax relief is sought must have been constructed or acquired after Dec. 31, 1950."

However, a booklet we have just received giving explanations of the Revenue Act of 1950, states the following: "The amortization allowance will apply only to a facility which is acquired or on which the work was completed after Dec. 31, 1949." Would you kindly check this, and let us know which is correct?

A. A. STROPPEL
Vice President & Treasurer
Sawbrook Steel Castings Co.
Cincinnati

The booklet on the Revenue Act of 1950 is correct in placing the date at Dec. 31, 1949. In our story of Oct. 5, we are guilty of the oldest and most frequent sin in the publishing industry—a typographical error. A previous story in THE IRON AGE (Aug. 24, p. 83), which we believe was the first major story in the trade press highlighting this subject, gave the date correctly.—Ed.

MACHINE TOOL High Spots



Sales Inquiries and Production

By W. A. LLOYD

Shortages Threaten—Plans for a speedy increase in machine tool production were headed toward the shelf this week as shortages of certain materials, including steel, pig iron, copper, aluminum and coke threatened to curtail production in a number of shops.

The industry has been hopefully seeking a blanket priority for materials, discussed in a meeting of the subcommittee of the Machine Tool Advisory Committee with NPA officials. The subcommittee presented exactly what it felt was needed, but it appears that priorities will be given only for materials required for defense orders at the present time.

Endanger Defense—This poses a serious problem for the average machine tool builder, who is trying to build up his manpower and production to take care of a growing volume of defense business. Domestic order volume is good and opportunity to build up is there, but the materials are lacking.

What will probably happen is that demand for machine tools for defense and foreign aid and armament programs will pyramid to the point where the withholding of priorities will endanger the entire defense program. Industry sources believe that in any event, priorities will be given within 6 months.

Toll of Confusion — Machine tool people are caught in a swelter of government confusion that has caused production to fall behind needs. October output could have been doubled but actually stayed at September levels because priorities were not forthcoming to help the industry get raw materials and other supplies. The rate of production is behind that attained in World War II.

If the government comes through, machine tool men can start catching up and produce at least $500 million worth of equipment in 1951, said Tell Berna, executive secretary of the National Machine Tool Builders Assn.

Indian Machine Tools—In Cleveland, a report on the proposed Indian government machine tool plant was released by NMTBA. It said assembly of machines will start within 6 months, and one of the main features will be a modern instructor's training school to be managed by foreign experts in the field. Private (machine tool) firms would be allowed to send their workers for training in the school.

S. A. Vankataraman, secretary of the Ministry of Industry and Supply, told a meeting of representatives of the Ministry of Industry and Supply and Oerliken Machine Tool Co., Zurich, Switzerland, which will manage the plant, that the government plant will be complementary to and not competitive with private industry.

Minimize Competition—The line of demarcation between the government plant and private industry would be that the government would not undertake manufacture of machine tools which are already being manufactured or are about to be manufactured in India.

It was decided that the following types and sizes of machine tools should be left to private enterprise: high speed gear head lathes, 7-in.; high speed shaping machines, 20 in. and 24 in.; high speed drilling machines 1¼ in. and below, and Universal horizontal and vertical milling machines.

Buys Wheeler Co. — In Hamilton, Ohio, it was announced that Hamilton-Thomas Corp. has acquired the capital stock of the C. H. Wheeler Mfg. Co., Philadelphia, a manufacturing and engineering company with assets of about $3 million. Hamilton-Thomas' four divisions here make planers, shapers, pumps and automatic regulating valves.

C. H. Wheeler Mfg. Co. has been designing and building steam condensing, vacuum producing and water cooling equipment for the past 50 years. Hamilton-Thomas officials said no change was contemplated in the operation of either company.

Expansion for Stokes—In Philadelphia, a $700,000 expansion program has been announced by F. J. Stokes Co., which will increase factory space one-third. Francis Dougherty, Stokes president, said completion is scheduled for early 1951.

Part of the program will involve expansion of laboratory facilities with new equipment, installation of precision testing and inspection apparatus, and many new machine tools. The company manufactures plastic molding and powdered metal presses.

Wartime Plant — Canton Drop Forging & Mfg. Co. has purchased a government-built wartime plant from the General Services Administration for $925,000. Canton previously leased the plant.

BUILDERS OF THE BRASS INDUSTRY

ISRAEL HOLMES
First President: 1850-1851

ELISHA WELCH
Second President: 1851-1887

ANDREW ATKINS
Third President: 1887-1893

JAMES WELCH
Fourth President: 1893-1902

PIERCE WELCH
Fifth President: 1902-1909

TEN MEN *whose names are lastingly engraved in* BRASS

JULIAN HOLLEY
Sixth President: 1910-1911

ALBERT ROCKWELL
Seventh President: 1911-1924

ALEXANDER HARPER
Eighth President: 1924-1935

ALBERT WILSON
Ninth President: 1935-1943

ROGER GAY
Tenth (and present) President: 1943-

THROUGH the minds of all these ten men . . . from Israel Holmes in 1850 to Roger Gay today . . . has run this same dominant determination: "Make Bristol Brass sheet, rod and wire the way the customer wants it. And the business will take care of itself!"

That code has proved to be, over 100 years, as sound as it is simple. For Bristol Brass has been one of the steadiest corporate ships in this country's industrial economy . . . never off an even keel, never badly storm-battered. But always, as with the merchant clippers from Bristol, England . . . Brass business conducted with the Bristol mills in Connecticut has been found . . . by customers in *all* industries . . . to be prompt in "getting under way," shipshape and sure-handed in handling, reliable in delivery . . . and, above all, consistent in quality.

The course is set the same, now, as always. *And the running lights are bright!*

One Hundred Years of BRASS made **"BRISTOL FASHION"**

Like the world-famed merchant ships from Bristol, England . . . Always prompt, shipshape, reliable

The BRISTOL BRASS CORPORATION, *makers of Brass in Bristol, Conn. since 1850*

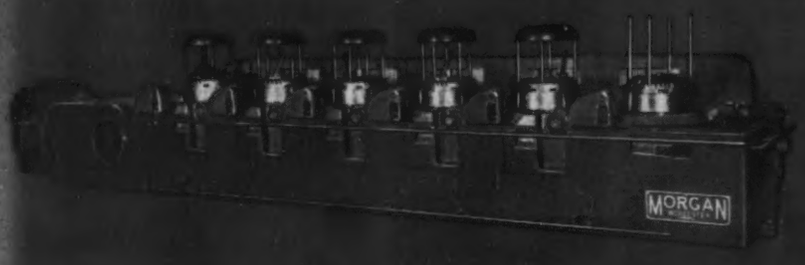
the Honeymoon is over

STIFF competition is here. It's time to clear out old methods and ideas.

Specifically: Start a replacement program. Begin with your least productive wire machines and replace them with modern Morgan-Connors.

. . . Get the benefits of:

— low power cost
— low die cost
— low space requirement
— high production



Morgan Connor
WIRE MACHINES

MORGAN CONSTRUCTION COMPANY, Worcester, Mass.

ROLLING MILLS · MORGOIL BEARINGS · REGENERATIVE FURNACE CONTROLS · AIR EJECTORS · PRODUCER GAS MACHINES

FREE — USE POST CARD

PUBLICATIONS

New publications that describe money saving equipment and services are available free and without obligation. Copies can be obtained by filling in the attached card and mailing it.

Surge-Relief Valve

Information on adaptability, adjustment, operation and servicing of G-A cushioned surge-relief valves is contained in a new 8-p. booklet. Various sizes of relief and relief pilot valves are described, and cross-section engineering drawings show operation. Other diagrams illustrate general arrangement of the units and typical installation layouts. Specifications are also listed. *Golden-Anderson Valve Specialty Co.*

For free copy insert No. 1 on postcard.

Portable Power Tools

Prepared primarily for the manufacturing, construction and automotive service industries, a new 72-p. catalog completely describes and illustrates more than 135 Skil electric and pneumatic tools. The booklet includes complete specifications and features, applications and uses on the popular Skil saws, drills, sanders and many other types of portable power tools. Featured for easy reading are detailed photos, individual tool sections and clear indexing. *Skilsaw, Inc.*

For free copy insert No. 2 on postcard.

Trucks and Trailers

The full line of K&J industrial and commercial trucks and trailers is covered in a new 30-p. catalog. Included are all commonly used types of trucks, from light tubular steel 2-wheel bottlers' trucks to heavy duty stevedore and freight terminal hand trucks; four and fifth-wheel wood or steel deck warehouse trucks; and custom designed and built trucks and trailers of up to 50 tons capacity. More than 95 models are available, as shown in the booklet, all with unusual overload factors to insure long service life and low maintenance. *Kilbourne & Jacobs Mfg. Co.*

For free copy insert No. 3 on postcard.

High Temperature Oils

The results of an extensive 18 months' research program on high temperature lubrication form the basis of a new 4-p. folder. The illustrated leaflet completely describes the testing procedure used by Houghton's research staff in setting up three series of Hi-Temp oils to meet all high temperature conditions up to and even over 500°F. Other products and special lubrications are also described. *E. F. Houghton & Co.*

For free copy insert No. 4 on postcard.

Saw Booklet

A handy selection guide and index for various models of Marvel hack saws and band saws is contained in a new 28-p. catalog. General features, applications and capacities are listed in the guide with a photo of the machine, making it easier to select suitable equipment for a given application. More detailed information on each type of unit is shown in other sections of the booklet, and data pertaining to saw blades, hole saws, hand hack saw frames and other hand powered tools are given. *Armstrong-Blum Mfg. Co.*

For free copy insert No. 5 on postcard.

Industrial Conveyers

The versatility, efficiency, dependability and low maintenance of Universal industrial conveyers are described in a new data sheet listing dimensions and specifications of the five different models available. Photos show use of the equipment in various industrial and warehousing materials handling operations. *Industrial Engineering & Mfg. Co., Inc.*

For free copy insert No. 6 on postcard.

Welder Described

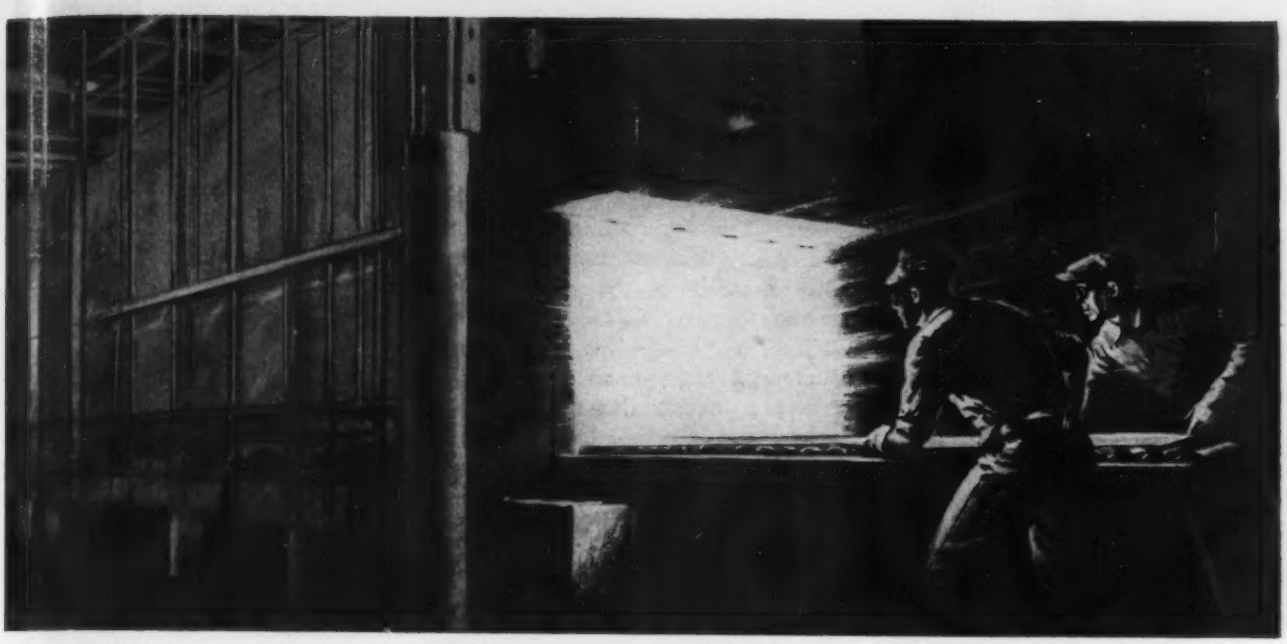
All the features of the P&H Model TR-180A ac limited input welder are listed in a new bulletin illustrating a number of its applications. The welder is shown to have a welding service range of from 20 to 180 amp and "Dialectric" heat control. The capacity of the model makes it valuable for the welding requirements of shops, garages, fabricators and farmers, as explained in the bulletin. *Harnischfeger Corp., Welding Div.*

For free copy insert No. 7 on postcard.

Mobile Crane

The Jones KL-22, a 2½-ton wagon crane built especially for factory, warehouse and railroad use, is described in a new 4-p. bulletin. Some unusual safety features are described in some detail and illustrations show typical applications. *Tractor & Equipment Co.*

For free copy insert No. 8 on postcard.



Appropriate NICKEL-CHROMIUM-IRON Castings Help Solve Furnacing Problems

Utilize the experience of alloy casting producers in selecting the correct alloy type to meet your specific needs.

Nickel-chromium-iron heat resistant castings... made in conformity with the Alloy Casting Institute designations with specified nickel contents ranging up to 68% and chromium up to 32% may be broadly classified as follows:

GROUP I—Very High Nickel—Low Chromium—Highly resistant to oxidation, carburization, nitriding, thermal shock and creep... this group of castings with very high nickel content provides extra stamina in vital heat treating and furnace applications.

GROUP II—High Nickel—Low Chromium—This group embraces the main furnace alloys. These high nickel—low chromium alloys are used extensively for salt and lead pots, furnace muffles and in highly stressed parts such as chains, link belts and other moving parts.

GROUP III—Low Nickel—High Chromium—Large tonnages of low nickel—high chromium alloys are used in the heat treating and furnace field. These castings are lower in cost than those of the first two groups. They provide somewhat less resistance to carburization and nitriding than do the higher nickel types.

GROUP IV—Very Low Nickel—High Chromium—Very low nickel—high chromium irons find their chief applications in high sulfur atmospheres and for elevated temperature service when high creep strength is not an important factor.

EMBLEM OF INCO SERVICE
TRADE MARK

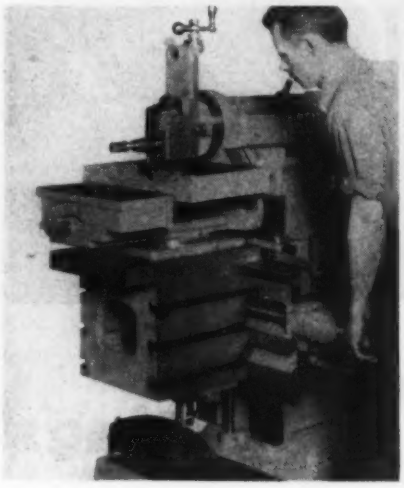
Because of unusually heavy industrial and defense demand, rationing of nickel has been in force since July 1st. However, we believe that dissemination of technical data and service experience can help to promote the intelligent utilization of critical materials, so essential in these times. We shall, therefore, continue to issue information on new developments and user experience with nickel-containing materials.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

NEW PRODUCTION IDEAS

Continued

work and shaping to a line. It is a standard machine except for the pad on the base, the masterform holder and a special table support



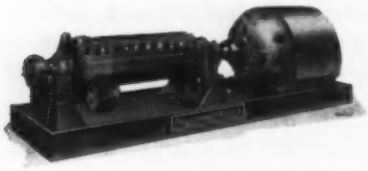
post, and can be used for regular shaper work as well as automatic duplicating. Changeover is simple and quick. The follower equipment can be supplied on any stroke or size of shaper. A die is machined by feeding the tool slide down in consecutive cuts to rough out the die and with a final finish cut to complete the surface. Limiting angle of climb is approximately 20°. Other types of duplicating followers for more intricate contours or shapes are also available. *Cincinnati Shaper Co.*

For more data insert No. 18 on postcard, p. 33.

Centrifugal Pumps

Multi-stage for pressures up to 1200 psi, capacities to 1600 gpm.

A line of new multi-stage centrifugal pumps are built in 3, 4, 5,



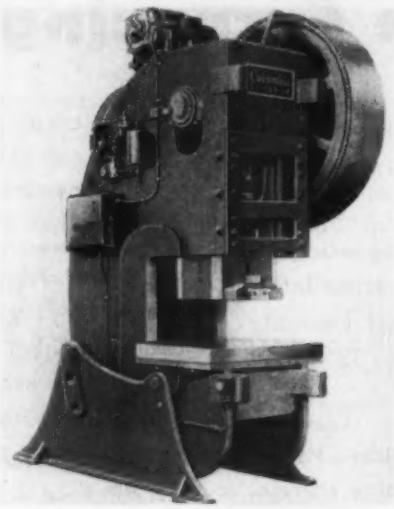
and 6-in. sizes with from 3 to 9 stages. Features of the new design are its cylindrical-bore, horizontally-split casing and compact, unit-type rotor assembly, composed of the shaft, impellers and channel rings. The rotor assembly can be easily and quickly removed from and installed in the smooth-bore casing. Applications cover a wide range of boiler-feed, pipe-line pumping, refinery and other high-pressure industrial services. *Ingersoll-Rand Co.*

For more data insert No. 19 on postcard, p. 33.

OBI and Gap Presses

Gap presses from 60 to 200 tons capacity; OBI from 10 to 200 tons.

For stamping, drawing, blanking, coining and embossing, a new line of open back inclinable and gap presses are of two basic designs, one for presses up to 45 tons capacity and a heavier, more rugged design for larger units. The smaller presses feature a light compact cone-type clutch and location



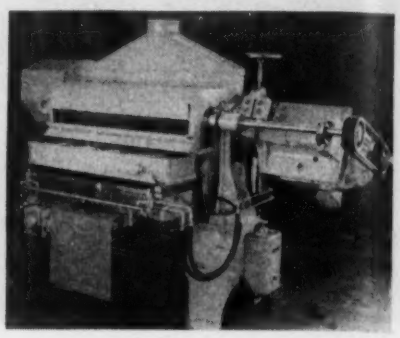
of the clutch on the crankshaft, and the flywheel effect is greatly reduced with a corresponding reduction in starting current consumption, heat generation and wear on the clutch and brake linings. Larger presses use the patented Alcone aluminum cone-type clutch that reduces size and weight with a corresponding reduction in flywheel effect. Presses are all-welded rolled steel construction with cast-iron slides and pitmans. Models are V belt driven. *Columbia Machinery & Engineering Corp.*

For more data insert No. 20 on postcard, p. 33.

Surface Finishing Machine

Suitable for small metal parts.

Equipped for mechanical or magnetic holding and actuated by an electro-hydraulic system, a new surface finishing machine uses a single spindle upon which a roll 40 in. wide may be mounted. Automatic hydraulic in and out stroke is adjustable from 0 to 24 in., with a



maximum holding and working area of 24 x 38 in. An air circuit provides float of buff at any predetermined uniform pressure. *Clair Mfg. Co.*

For more data insert No. 21 on postcard, p. 33.

Drill Press Vise

For quick, easy set ups; precision made and built for heavy service.

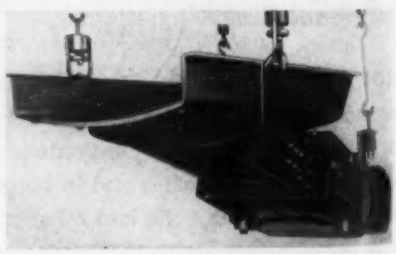
A new low priced Palmgren No. 40 vise has jaws 3½ in. wide, opens 3½ in. and has a jaw depth of 1⅝ in. The movable jaw is grooved vertically for holding round work. A heavy steel adjusting screw has a coarse pitch Acme thread for fast-action, and a swivel crank handle provides ease in turning. *Chicago Tool & Engineering Co.*

For more data insert No. 22 on postcard, p. 33.

Vibratory Feeder

Sealed protection does not affect the feed rate.

A dust-tight vibratory feeder has its working parts—the leaf springs, the armature, and the core

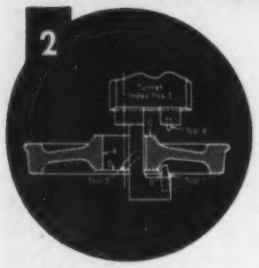


—covered by gasket-sealed plates bolted to the magnet coating. By enclosing these parts, protection is obtained against clogging by ex-

Turn to Page 92

BULLARD MAN-AU-TROL V.T.L

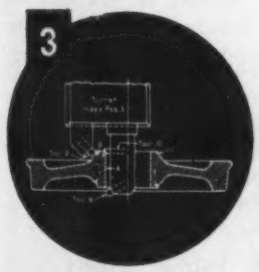
Boston and Maine Railroad takes advantage of a 54-inch Bullard Man-Au-Trol V. T. L. for machining three sizes of Diesel Locomotive wheels 3 times faster than formerly.



Proper tooling, proper sequence and automatic timing of operations, maintains accuracy and saves much time.

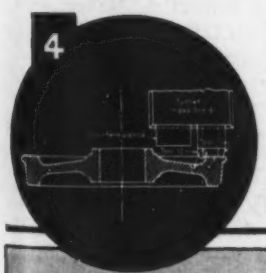
Turret Face #1

Rough bore — straddleface hub — rough form upper radius.



Turret Face #2

Semi-finish bore — finish face upper hub face — rough form lower radius — generate 20 degree angle — finish form lower radius — generate 45 degree angle and finish face underside of hub.



Turret Face #3

Finish bore and chamfer — finish form upper radius — finish hub diameter.

Turret Face #4

Face rim — cut wear groove.

In addition to this method, ask for information on the 54-inch 3 Head Bullard Man-Au-Trol Car Wheel Machine.

There is a Bullard machine for nearly any railroad vertical boring, turning and facing job as well as the regular horizontal boring, drilling and milling jobs.

Write for information relative to your specific work.

BULLARD

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

Iron Age *Introduces*

R. E. MOORE, elected to the board of directors of Kropp Forge Co., Chicago.

WAYNE BELDEN, elected executive vice-president of Ajax Flexible Coupling Co. Inc., Westfield, N. Y.

EDMUND FITZGERALD, elected a director of the Chain Belt Co., Milwaukee.

Edmund A. Watson, appointed assistant to the vice-president of AMERICAN CAR & FOUNDRY CO., New York.

Robert C. Hills, Thomas R. Vaughan and **Richard C. Wells,** elected vice-presidents of FREEPORT SULPHUR CO., New York.

George W. Vaught, financial vice-president of B. F. GOODRICH CO., Akron, Ohio, will retire Dec. 1.

Lester C. Higbee, appointed director of engineering for W. & L. E. GURLEY, Troy, N. Y.

Paul L. Dragon, named manager of labor relations, Operating Dept., for COLUMBIA STEEL CO., San Francisco.

John J. Kenney, named general service manager for INTERNATIONAL BUSINESS MACHINES CORP., New York. **Ivor C. Armistead, Jr.,** made manager of customer engineering and **William E. Gallagher,** administrative assistant, customer engineering dept.

W. C. Newberg. made a vice-president and director, Dodge Div., of the CHRYSLER CORP., Detroit. **C. E. Buchholzer** will succeed Mr. Newberg as president of the Airtemp Div.

A. C. Perks, elected president and general manager of ECLIPSE FUEL ENGINEERING CO., Rockford, Ill.

R. J. Weber, appointed assistant district manager, central district, for WESTINGHOUSE ELECTRIC CORP., Pittsburgh. **P. T. Lagrone** will succeed Mr. Weber as central station manager, with **F. E. Reiber,** as his assistant. **Dr. Charles M. Slack,** named assistant manager and **Frank R. Benedict,** director of engineering and research, Atomic Power Div.

Walter F. Garlow, appointed sales promotion manager of the HOWE SCALE CO., Rutland, Vt.

John C. Scott, appointed superintendent of industrial relations, Waukegan Works, AMERICAN STEEL & WIRE CO., Cleveland. Mr. Scott succeeds **Francis T. Swain,** who resigned.

Francis C. Hardie, made manager, Indianapolis district sales office for CARNEGIE - ILLINOIS STEEL CORP., Pittsburgh. **Mr. Hardie** succeeds **William E. Blackburn,** who has retired. **Fred K. Schefe,** named staff engineer for flat rolled products, Pittsburgh office. **Robert W. Holman** will succeed Mr. Schefe as chief engineer of the sheet and tin mill.

E. J. Rathsack, named secretary and engineer in charge of production for KENWORTH METAL STAMPING CO., Milwaukee.

J. Howard Patton, named plant manager, and **Robert S. Miller,** sales manager for CLIMAX MACHINERY CO., Indianapolis.

Harold H. Dice, appointed administrative assistant, Electro-Motive Div., of GENERAL MOTORS CORP., Detroit. **John H. Anderson** will succeed Mr. Dice as director of test and inspection.

Henry A. Houston, appointed assistant manager for KAISER-FRAZER CORP., Willow Run, Mich.

Harry L. Fox, appointed superintendent of blast furnaces, and Dale E. Bartholomew, assistant superintendent, Farrell Works, for SHARON STEEL CORP., Sharon, Pa.

Jack Cherry, named sales manager of air conditioning and freezers for PHILCO CORP., Philadelphia.

David F. Seymour, named plant manager and supervisor of manufacturing operations, South Gate, Calif., plant of the DIVERSEY CORP., Chicago. Mr. Seymour succeeds Eric C. Foote, Jr., who was made plant manager and supervisor of manufacturing at the Port Credit, Ontario, Canada plant.

Lawrence L. Garber, named general manager, American-Fort Pitt Spring Div., of H. K. PORTER CO., Pittsburgh.

Damiano Piccinini, appointed sales representative in Toscana, Liguria and Lazio, Italy, for the ERIEZ MFG. CO., Erie, Pa.

Albert E. Binger, appointed industrial sales manager for PHILIP CAREY MFG. CO., Lockland, Ohio.

William J. Healey, appointed manager, New York office, for WESTON ELECTRICAL INSTRUMENT CORP., Newark, N. J.

Raymond W. Sundquist, appointed assistant division superintendent of blast furnaces, Gary Works, for CARNEGIE-ILLINOIS STEEL CORP., Pittsburgh.

Milton S. Angier, named manager, customer section, central station sales, for WESTINGHOUSE ELECTRIC CORP., Pittsburgh.

Huntly M. Campbell, appointed assistant general sales manager and Edgar N. Rosseau, named assistant to the general sales manager, Western Brass Mills Div., for OLIN INDUSTRIES, INC., East Alton, Ill.

E. K. Walsh, appointed assistant general manager of sales for the AMERICAN CAN CO., New York. B. R. Wood will succeed Mr. Walsh as manager of sales, Atlantic Div.

Herbert J. Werner, has joined COLUMBIA MACHINERY & ENGINEERING CORP., Hamilton, Ohio, as chief engineer, Mechanical Press Div.

Iron Age Salutes

JAMES G. FORD

DRIVE, shrewdness and inventiveness are a combination hard to find and hard to beat. Westinghouse found them in James G. Ford, and that combination has placed him among the fraternity of America's inventors.

An inventor, according to Webster, "contrives something new and original." Thirty times the U. S. Government has agreed that Jim Ford has filled the requirements for a patent. And he has 13 more patents pending.

From insulation to eyecup, Jim Ford has spent his time improving the products he works with and the methods of making them. Those patents cover insulating oils, liquids, insulating compounds for transformer tubes and coils, core bonding materials and methods of manufacturing transformer cores.

Repeatedly Westinghouse has thrown Jim Ford tough problems and he has come up with the answers. He has worked on application of grain oriented, cold-rolled steel for transformer cores, assisted in development of household refrigerators, transformers and motors. During World II he helped perfect underwater ordnance and worked on radar.

That patented eyecup is composed of special materials and, filled with pure water, forms a solution of proper antiseptic strength.

In 1939 Westinghouse gave Jim Ford its highest award, the silver W, for resourcefulness and practicality in creation of new products and processes.

In 1941 Mr. Ford transferred to the Westinghouse transformer division at Sharon, Pa., where he established a manufacturing engineering department and became its manager.

Jim Ford attended the University of Pittsburgh and Carnegie Institute of Technology. He joined the Westinghouse research laboratories in 1917. He is a member of the American Chemical Society, American Society for Testing Materials and American Institute of Electrical Engineers.

Jim Ford likes to get out into the outdoors. If you play golf with him you're in for a tough game. He specializes in iron shots and plays a better game using irons alone than most people do with a full complement of clubs.

Jim likes to hunt and fish and has proved his skill. Last year at a dinner following a hunting party, the buck Jim had bagged provided the main course. At the poker table he plays a shrewd hand, probably profiting from experience gained as a World War I cavalryman.

CHARLES BELDEN, made vice-president of Ajax Flexiblve Coupling Co. Inc., Westfield, N. Y.

IRA N. GREAVES, appointed superintendent of industrial relations, Duluth Works, of American Steel & Wire Co., Cleveland.

HARRY G. MORROW, named vice-president of L. B. Foster Co., Pittsburgh.

Herbert N. Riband, named general manager Accessory Div., for PHILCO CORP., Philadelphia, and **Clare Courtney**, made sales manager.

Thomas R. Reid, appointed director of the newly created office of information on governmental affairs for FORD MOTOR CO., Dearborn.

Maurice J. O'Connor, Jr., appointed executive assistant to the general sales manager, Oldsmobile Div., of GENERAL MOTORS CORP., Detroit.

C. E. Etzler, appointed district sales engineer in eastern Pennsylvania for RELIABLE SPRING & WIRE FORMS CORP., Cleveland.

Henry L. Grimme, named industrial representative in Kansas City for WYANDOTTE CHEMICALS CORP., Wyandotte, Mich.

S. K. Augustine and **H. Watson**, appointed assistant comptrollers of the AMERICAN - STANDARD CORP., Pittsburgh.

Peter Stoffel, named supervisor, educational section, Sales Promotion Div., of BURROUGHS ADDING MACHINE CO., Detroit.

Gordon L. Leach will resign as manager, Automotive Div., of HUNT-SPILLER MFG. CORP., Boston, effective Dec. 1.

Joseph A. Conlon, appointed manager of allied sales, Mechanical Goods Div., for U. S. RUBBER CO., New York. **Edwin D. Meade**, made district sales manager, Chicago branch.

Ralph S. Lorimer, appointed branch manager, Washington office, of NATIONAL SUPPLY CO., Pittsburgh.

Kenneth L. Sayre, Gordon W. Andersen and **Edward G. Appel**, appointed to the staff of BJORKSTEN RESEARCH LABORATORIES, INC., Chicago.

Robert G. Van Keuren, appointed chief sales engineer, Abrasive Div., of the NORTON CO., Worcester.

R. E. Esch, appointed general sales manager of VICKERS, INC., Detroit.

Dr. Robert F. Thomson, appointed assistant head, Metallurgy Dept., Research Laboratories, for GENERAL MOTORS CORP., Detroit.

Vincent P. Oatis, Jr., named assistant manager of electrical busway and underfloor raceway sales for NATIONAL ELECTRIC PRODUCTS CORP., Pittsburgh.

John H. Baker,, named manager, Washington office, for SOLAR AIRCRAFT CO., San Diego, Calif. **Philip L. Ward**, made assistant chief engineer, Development Engineering Div., San Diego plant.

OBITUARIES

Thomas P. Kirk, 47, purchasing agent for Laclede Steel Co., St. Louis, passed away recently.

Charles A. Boyd, mechanical engineering consultant, died Nov. 5.

A. Fred Crossman, president of Lindsay Wire Weaving Co., Cleveland, died Nov. 4.

Lewis John Firth, 92, retired chairman of the board of directors of Firth-Sterling Steel & Carbide Corp., McKeesport, Pa., passed away Nov. 3.

Clinte G. Thomas, retired, founder, former president and chairman of the board of directors of Thomas Steel Co., Warren, Ohio, died Nov. 11.

Temple W. Tutwiler, president of Black Creek Coal & Coke Co., Birmingham, passed away recently.

Lester M. Taylor, 60, director of car distribution for Buick Motor Co., Flint, died Nov. 12.

Charles Fletcher Regan, 62, vice-president of Barnsdall Oil Co., Los Angeles, died Nov. 9.

Ernest V. Moncrieff, 60, former president of Swan-Finch Oil Corp., New York, died Nov. 5.

Dudley G. Bolton, 79, branch manager in Dallas for Fairbanks, Morse & Co., Chicago, passed away recently.

Russell W. Schultz, 61, sales manager for Bethlehem Pacific Coast Steel Corp., Portland, Ore., passed away Nov. 6.

A. J. Morson, auditor for the Birmingham Rail & Locomotive Co., Birmingham, died recently.

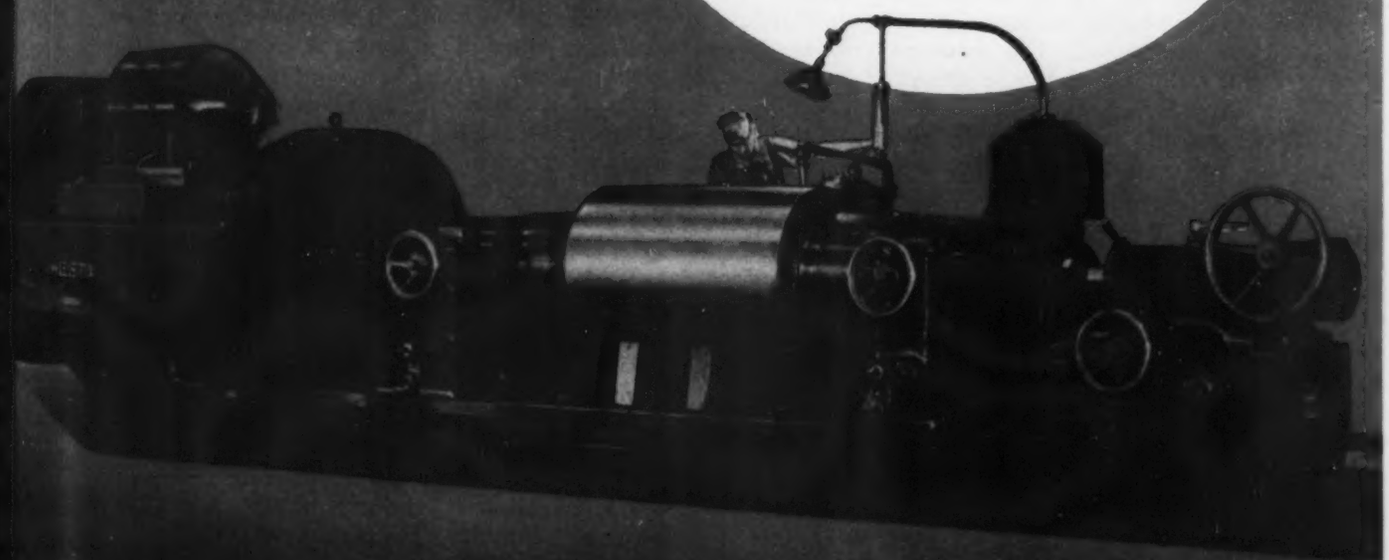
MESTA

Heavy Duty

Roll Grinders

Mesta Roll Grinders of simplified design are the most accurate and dependable grinding machines available. Built with precision for finest finishing and ruggedness for heaviest roughing.

Finishing a 36½"x 56" Mesta Alloy Iron Roll in a Mesta 60" Heavy Duty Roll Grinder.



MESTA MACHINE CO., PITTSBURGH, PA.

On the ASSEMBLY LINE

AUTOMOTIVE NEWS AND OPINIONS

Car producers striving to hold production rate but output is falling . . . Aluminum order creates widespread confusion . . . Used car dealers pool cars . . . Shortages may hike sales.

By WALTER G. PATTON

Production Up or Down?—Washington-made shortages have not yet hit Detroit. The industry is still rolling as fast as suppliers permit. There is no reason to believe any auto maker will willingly ease up on production. On the contrary, the threat of allocations on some quota basis may even encourage production at a faster pace.

Still, auto production is fading—even before aluminum and copper allocations take their toll. Examination of the record will show this. For the first 6 months of this year, the industry output averaged about 192,000 units a week.

During August, production reached a weekly average of 196,000 vehicles assembled in U. S. and Canada. October output was nearly as high, averaging 192,000. For the week ended Nov. 11, Ward's estimated the total dropped to 161,000. The current rate is about 125,000, including a Pontiac and Chevrolet changeover.

Ford on 3 Day Week—Ford operations at the Rouge are temporarily down to 3 days a week. Eventually, Ford assembly plants throughout the country will feel a reduction in Ford schedules now estimated at 80,000 units. Any future production losses resulting from nickel or copper stockpiling will have to be added to this.

Order Hits Hard—Unless the aluminum order issued in Washington this week is revised, the auto industry will be dealt a stiff blow. Where the blow will fall hardest is anybody's guess. A great deal depends on revisions of the order that may be made between now and January. Principal uses of aluminum by the industry today are pistons, automatic transmissions, die castings and scuffboards.

The weight of a 35 pct aluminum cutback has auto engine builders frankly worried. At present, only Chevrolet and Pontiac use cast iron pistons. To change other cars over to cast iron pistons would require rebalancing of the engines and extensive retooling—a decidedly unpleasant prospect. Automatic transmissions use a very considerable amount of aluminum. Buick, Packard, Studebaker and Ford could be particularly hard hit; Chevrolet uses steel stampings extensively. Hydra-Matic also uses a number of aluminum parts.

Bus Builders Threatened—Probably the worst threat is against bus and trailer production. Bus sales have been slow for months. Recently, orders picked up. One builder reported his aluminum requirements for bus orders on hand are 20 times the amount permitted by the allocation order. Both bus and trailer industries are confident some relaxation of the aluminum order is inevitable as far as their industries are concerned.

Based on Consumption—The aluminum order is based on actual consumption of the metal—not on purchases. On this basis, Chrysler Corp., for example, will have to seek relief for the aluminum it did not consume during its 100 day strike.

Purchasing agents have the difficult problem of trying to decide right now whether they should order enough aluminum for January delivery to cover their legal consumption under the present terms of the order or whether they should order an amount which takes into account some of the inequities that may be corrected later on.

The number of auto parts being made of aluminum which could be made of some other material without extensive tooling changes is

small. A changeover could be made rather quickly for parts like scuffboards, assuming steel is available.

Aluminum Riddle—Another unsolved aluminum riddle is whether or not a big corporation, for example, will be limited to 65 pct of total purchases of the company or 65 pct of *individual* purchases by each division of the corporation. In other words, distribution of available aluminum within a corporation like General Motors could be seriously affected by Washington's interpretation of the aluminum order.

Regulation W—It is still too early to measure accurately the effect of the recent change to Credit Regulation W. In Wayne County, for example, October sales of used cars were down 20 pct from September. This is a decline of 12.4 pct compared with a year ago. For the year to date, new car production is running about 25 pct *ahead* of the 1949 pace.

Export Trade—Light cars now being produced, Nash and Kaiser-Frazer, may help stimulate the export trade. It will not be surprising if Nash and K-F are joined in the not-too-distant future by Willys. From the standpoint of percentage of cars exported, Willys leads all other U. S. producers.

Car Stocks — Reports of car stocks building up in the field are beginning to come in again. This has been the case every year about this time. Many of these reports are true, although the nationwide picture will still show that no dangerous buildup in new car stocks has occurred. There are large stocks of some makes of cars in Wayne County and elsewhere at present. However, the national distribution picture is still reasonably good. Dealer inventories are climbing but not at an alarming pace—auto executives claim.

Reorganize Sales — Automobile dealers are beginning to think again about reorganizing and rebuilding their sales departments. Several of the major producers have organized used car sales campaigns. The campaigns are expected to be the most extensive carried out since car production was resumed following the war. Every auto sales official admits that, in the final analysis, the sale of new cars depends on the ability of the dealer to move his used cars.

Water Test—At its Warren Ave. plant, DeSoto passes car bodies through a water testing booth 106 ft long where hundreds of gallons of water under pressure are sprayed on the new bodies. In addition to detecting body leaks, the water spray indicates quickly variations in parts being produced.

Another innovation at the DeSoto plant is recirculating the water used to cool welding electrodes to the wet sanding department. The warm water is said to be particularly effective in the wet sanding operation and also has a beneficial effect on working conditions.

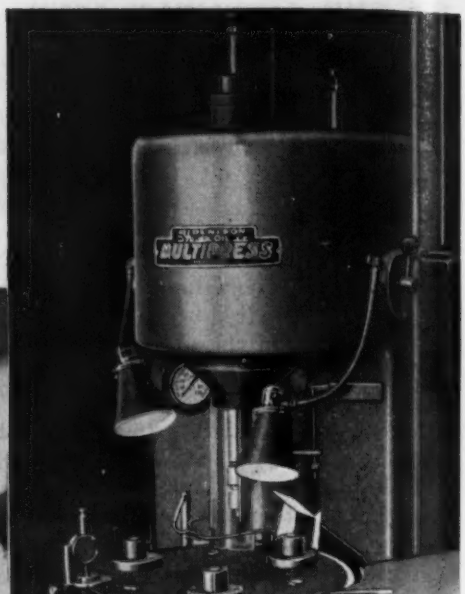
Used Car Pool—Another interesting development in used car sales technique was announced last week. Veteran used car dealers along fabulous Livernois Ave. in Detroit are pooling their inventories to combat the ill effects of Regulation W.

Under the new plan, the used car dealer may obtain from another dealer on a few minutes' notice, the year and model sought by the customer. There is, of course, a commission to the dealer who finds the sales prospect. Meanwhile, dealers specializing in used cars of prewar vintage are having a field day in Detroit. Temporarily low down payments on such cars have resulted in a substantial upswing in demand.

Effect on Sales—In the months ahead it will be interesting to watch the effect on automobile sales of the threat of a controlled materials plan. All of the experts are predicting such a plan will be in effect before mid-summer next year. If prospective car purchasers are convinced that a controlled materials plan is inevitable, there could be a stimulating sales effect, particularly on new cars.

THE BULL OF THE WOODS — By J. R. Williams

4 Tons of Pin-point Accuracy

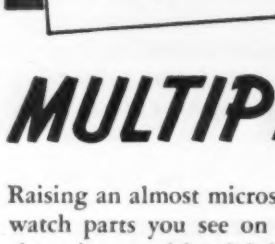


MULTIPRESS® puts a microscopic peak on a tiny Elgin Watch part

Raising an almost microscopic tip on one end of the tiny watch parts you see on the man's fingers in the photo above is a precision job if there ever was one. Multipress swages them at the rate of 7000 per day at the Elgin National Watch Company, of Elgin, Illinois.

The small tip must be accurate within .0004" in diameter, and within .002" in height.

The Multipress is an 8-ton model equipped with a six-station indexing table featuring skip-station accessory control. Precision dies are mounted in special fixtures at three of the six stations. The skip-station accessory permits the table to by-pass untooled stations without loss of time.



The index table operates in positive sequence with the press ram through the control system of the press, in a continuous cycle. As the press ram—preset to deliver a 4-ton effort—swages the part that has indexed under the ram, other parts are loaded into fixtures at the front of the index table. An ejector cam under the table lifts the swaged parts out of the die as they index beyond the ram station. A jet of air whisks them into a tote box.

Multipress delivers its full force by a quick build-up rather than sudden impact. This gives the metal time to flow into the contours of the die instead of being smashed into shape, which gets better results and higher accuracy with less spoilage.

Multipress advantages on this operation (formerly handled on a drop hammer) include easier maintenance of close tolerances, faster production, increased safety, better working conditions due to less noise and vibration, and compact design that saves floor and overhead space. These advantages—and many more—have been proved on other production jobs in an amazing variety of types and sizes. Multipress is available in eight frame sizes—1 to 50-ton capacities! Write for details.

The Denison Engineering Co.
1158 Dublin Rd., Columbus 16, Ohio

DENISON Hydr OIL ics

WEST COAST PROGRESS REPORT

Digest of Far West Industrial Activity—By R. T. REINHARDT

Coast Steel Growth—While it is generally known that steel capacity has expanded in the western states far more rapidly percentage-wise than elsewhere in the country—more than 300 pct in the past 10 years and about 750,000 tons in the last 5 years—the total cost of these expansions has been lost sight of.

A survey made last week by THE IRON AGE among western steel producers indicates that approximately $150 million has been invested in the past 5 years to bring about this most recent and postwar expansion. This is the amount invested in new equipment from iron ore mines to rolling mills.

More Expansion Coming—On a cost per ton basis this figures out to approximately $200 which is considerably below some of the more recently made estimates on the cost of new facilities. However, the total figure includes mill improvement, furnace enlargement and equipment for more efficient furnace operation as well as new or rebuilt furnaces.

In addition to the millions already invested in the past 5 years, not including the purchase of Geneva Steel Co. by U. S. Steel Corp. which was already producing in 1945, further expansions and developments, most of which will be completed within a year or two will cost approximately $87 million more.

Alumina Plant "Considered"—Harvey Machine Co. of Torrance, Calif., has been considering the possibility of putting a plant for the production of alumina from imported bauxite in the Portland. Ore., area to supply its proposed aluminum reduction plant at Kalispell, Mont. The project is still in an exploratory stage.

In spite of the vast aluminum reduction plants operating in the Pacific Northwest no alumina plants exist there, with all alumina being brought in from the southeastern U. S.

Brighter Aluminum — Kaiser Aluminum & Chemical Corp. last week announced Kaiser Aluminum Bright Dip, a new and inexpensive process for brightening aluminum and its alloys. The new process is said to be simple and direct and has the advantage of being more economical than other methods, easy to control, involving no occupational hazards and having a wide variety of application. It will be made available under license to aluminum fabricators and processors through Kaiser Aluminum & Chemical Sales, Inc.

Record Scrap Prices Hit Coast—A tightening scrap market on the West Coast last week impelled buyers to raise their offering prices to record highs. No. 1 heavy went from $26.50 per gross ton delivered to $30. Other grades fell in line.

Undoubtedly some scrap dealers have been stockpiling inventories awaiting better prices and the shutting down of Kaiser Steel Corp.'s No. 1 blast furnace 2 weeks ago put that company more strongly into the market with a resulting still heavier demand.

Manpower Bogey — Manpower shortages will start plaguing the nonferrous metals industry as soon as the Defense Minerals Administration gets its program under way, says Otto Herres, vice-president of Combined Metals Reduction Co., Salt Lake City, who recently completed a manpower survey for the government agency.

Mr. Herres found that some areas are unable to get all the workers needed at the present time, but in the over-all picture the shortage is not serious. However, as the government pushes the program to encourage exploration and development the squeeze will get tighter throughout the industry.

Open pit copper mines, according to Mr. Herres, are currently operating at or near wartime capacity and the smaller operations are gradually increasing production.

No Copper Fabrication—Charles R. Cox, president of the Kennecott Copper Corp. and former president of Carnegie-Illinois Steel Co., said Kennecott had no plan under way to establish fabricating facilities in the vicinity of the new $16 million refinery dedicated last week on the shore of Great Salt Lake. He added however that he would welcome construction of such plants by competitors.

He reported that a study was being made of ways and means to increase copper production at the firm's Nevada properties.

THE FEDERAL VIEW

THIS WEEK IN WASHINGTON

By EUGENE J. HARDY

Production Planning—Planning for mobilization often gets thrown overboard when the time to mobilize rolls around. An example is the M-Day plan of the Army-Navy Munitions Board which was junked when the U. S. entered World War II.

This time, it's different, for the present Munitions Board is putting into effect many of the plans and programs on which it has been working since the end of the last war. Most recent example is a policy statement coordinating and integrating current expanded military procurement with the Board's production allocation program.

Survey of Industry—This program included a survey of thousands of major industrial plants. As a result of this survey, each of these plants was assigned the military items it would produce in the event of mobilization. Each plant was also assigned to one of the three services for procurement planning responsibility.

Procurement officers are now under orders to assure that all negotiated contracts in excess of $100,000 are placed with firms within the production allocation scheme to the greatest extent possible. They are also to be placed so as not to interfere with previous plans for allocation of plant capacity on the part of other services. Contracts which are let after formal advertising are not covered by the new policy.

Inspection Policy—Another new policy of the Munitions Board should accomplish much toward ending industry's complaints over duplication of item inspection on the part of the military services. This policy provides for maximum interchange of inspection services and standardization of actual inspection.

New Taxes??? — Congressional leaders agree that the White House could be doing more than it is to encourage passage of an excess profits bill at the coming short session of Congress.

Chairman Doughton, D., N. C., of the House Ways and Means Committee, is showing his loyalty to the Administration by speeding up the public hearings on the tax bill so that there will be sufficient time—if not the inclination—to pass such legislation before the Christmas holidays.

White House Diplomacy—But even before the hearings opened, the White House had at least one strike against it. For some reason unknown to Chairman Doughton, the text of President Truman's letter to him on the subject of the new revenue bill was released to reporters at the White House before the veteran Ways and Means chieftain had even heard of the letter. Such a move was hardly calculated to improve the frequently ragged relationships between the White House and the Congress.

Few congressmen seriously believe that the present "lame-duck" session will enact the $4 billion tax bill Mr. Truman demands. The incoming 82nd Congress will give careful study to the matter and may well decide to jettison so-called "excess profits" legislation in favor of higher rates in the existing structure of corporate and personal income taxes.

Steel for Oil and Gas — New steel demands under National Production Authority's special program set-up are in the making, this time for the oil and gas industry. As a sort of prelude, Interior Secretary Chapman has thrown new support to the perpetual drive by some government officials for more and faster capacity expansion.

That he holds little expectation of getting enough oil and gas steel without controls of some kind is seen in the veiled warning that the oil and gas industry steel requirements must be met in full or else—the else, in his words, being government regulation. In the meantime, the Petroleum Administration for Defense (under Interior) is readying its compilation of data as to what these requirements might be.

NPA Enforcement — The National Production Authority should have its enforcement division operating within a few weeks. At present, it exists only on paper. However, NPA Administrator Harrison says that there have been no major reports of violation of regulations issued thus far.

A lot to be thankful for—

Thanksgiving again—Thanksgiving in spite of the fact that defense demands have caused shortages in many lines.

Some critics of the good American Way might say the bird bespeaks much feasting but little thanks.

They would be vastly enlightened if they could know the gratitude in the hearts, if not on the lips, of all of us privileged to share this land of plenty. For, in these troubled times, no thinking American can fail to appreciate more than ever before the freedom and fruitfulness that is his birthright.

And so again we pause to express our thankfulness for friends and country, and for the spiritual and material strength which have preserved our rights throughout the past and will defend them in the future.

JOSEPH T. RYERSON & SON, INC.

RYERSON STEEL

IRON AGE
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FEATURE ARTICLES

NEW NOTES ON

High Strength Heat-Treated Steels

Part I

By G. SACHS, Vice-President, Horizons, Inc., G. S. SANGDAHL, President, Metals Research Associates, Inc., and W. F. BROWN, JR., Lewis Flight Propulsion Laboratory, National Advisory Committee for Aeronautics, Cleveland. (Left to Right.)

Conventional classification of heat-treated, high-strength steels according to hardenability is incomplete. Notch bar tensile tests reveal large differences in properties of specimens heat treated to nearly identical hardness, tensile strength and elongation. The strength and ductility of high strength steels depend upon their chemistry and structure, as shown in static and impact notch bar characteristics.

THE last 10 years have brought about an important, progressive development regarding evaluation of the strength properties of several classes of steels. These materials are known to exhibit extremely dangerous service failures of a brittle nature without any previous warning, under conditions of straining which for a long time could not be accurately analyzed.

Until a few years ago, such failures were believed restricted to applications involving both impact and low temperatures. It has since been definitely established that brittle failures in steels may occur under static load conditions as well as under impact, and with normal atmospheric temperatures.

The brittle failures encountered in heat-treated steels have attracted comparatively little attention. Many engineers are probably not familiar with the existence of this problem. Some published information indicates that heat-treated steels can be used indiscriminately up to a tensile strength of a least 250,000 psi, and that a tendency toward brittleness would not be encountered until these limits are exceeded. Actually, steels that are heat treated to strength values over 200,000 psi cannot be used for many constructional parts because of their excessive brittleness under certain load conditions.[1]

In recent years, test methods using sharply notched tensile specimens have been developed.[2, 3] These permit evaluation of heat-treated, constructional steels of high strength and hardness in regard to their tendency to embrittlement. Such investigations have clearly revealed consid-

erable differences between dissimilar steel compositions possessing similar conventional properties.[4] They have also demonstrated the damaging effect of imperfect heat treating or slack quenching.[5] Recognition of these relations should also render it possible to develop tailor-made steels combining extreme strength with notch ductility. The results of a first attempt in this direction were reported recently by Payson and Nehrenberg.[5]

In the majority of high strength applications, heat-treated steels which possess the highest possible uniformity in properties over the entire section are desired. For this reason, high strength, constructional steels are generally classified according to their hardenability. In thin sections, the desired through-hardening can be obtained with almost any steel composition.

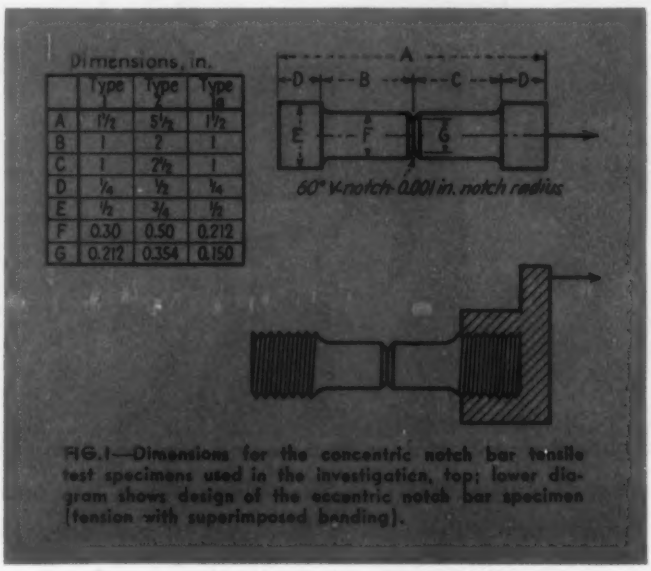


FIG. 1—Dimensions for the concentric notch bar tensile test specimens used in the investigation, top; lower diagram shows design of the eccentric notch bar specimen (tension with superimposed bending).

Whether steels possessing equal hardenability are also identical in other respects which determine their service performance is not known. The popular concept that such steels, if heat treated to a given strength or hardness are fully replaceable, certainly does not apply universally. Despite the widely publicized, predominant importance of hardenability, many rather expensive steel compositions are often used for applications where the hardenability requirement could be met with a less costly steel.

For uses where moderate strength, less than 175,000 psi, and very high ductility is desired, any steel composition may be suitable that consistently yields the desired strength level. In such instances, considerable deviations from a fully hardened condition can be tolerated. In many such applications, steels are being used that do not fully harden, or that are not quenched fast enough to yield a fully hardened structure. Such slack-quenched steel parts appear to perform satisfactorily in those practical uses where the strength requirements are moderate.

To date, no testing method is known which will differentiate between various heat-treated steel specimens possessing equal but moderate strength. If a steel is very ductile, all criteria of ductility derived from mechanical tests fail to yield data which characterize and distinguish the various steels. While the ductility may appear considerably different in conventional tensile tests, such differences may be immaterial and often misleading.

Evaluation of the effects of steel composition is quite different for very hard steels possessing a hardness near and beyond 500 Bhn. Such steels vary widely in regular tensile strength and ductility. In these respects, certain compositions are known to be definitely superior to others of equal hardenability. A variety of test methods, including tensile and torsion tests, can be used for a distinction and classification of very hard construction steels and die steels.

Steel composition, however, is only one of several factors determining service performance of such very hard steels. The manner in which the steel has been processed to its finished size, and particularly the reduction from the ingot, are known to considerably affect the impact strength.[1] The results of notch tests confirm the long suspected but little investigated effect of steelmaking practice.

The work reported in this investigation has been devoted primarily to the problem of distinguishing between different low alloy steel compositions that were heat treated to a tensile strength above 175,000 psi, or hardnesses between 350 and 500 Bhn. According to conventional tensile tests, such steels, if fully hardened and tempered to a given value of hardness or tensile strength, possess practically identical mechanical properties. All such steels are quite ductile, according to the results of tensile tests. While considerable differences were found to exist between the reductions in area, the significance of this fact is obscure, in regard to service performance.

Notch bar tests show that the properties of such steels are greatly dependent upon chemistry, the method of steelmaking, and hardenability. The present investigation comprises an attempt to evaluate the effects of single alloying elements on the properties of tempered martensite, rather than to compare standard SAE grades of steel. It relates primarily to steels containing 0.40 pct C, and in addition 3.5 pct Ni, 1 pct Cr, or 2 pct Mn, respectively.

Manganese steels were found to be very inferior to either chromium-or nickel-containing steels. Furthermore, another investigation[6] showed a low-carbon, nickel-molybdenum steel to

possess notch strength and fatigue properties superior to those of any other steel if heat treated to hardnesses above 400 Bhn.

A variety of steel compositions and heats were heat treated to different strength values by various quenching methods and tempering at temperatures ranging from 300° to 1000°F. Regular tensile tests served to establish accurately the relation between tempering temperature and tensile strength. Conventional impact tests of the V-notch Charpy type, and concentric notch bar tensile tests, were then made at a number of selected values of tensile strength.

The concentric notch bar tensile tests, developed to study heat-treated steels, uses a special fixture and a carefully prepared, suitably notched specimen for obtaining results that are consistent and sensitive to variations in metal properties. The specimen shown in Fig. 1 is of the buttonhead type with a cylindrical portion reduced in area at the center of its length by a circumferential notch. A sharp V-notch, having a flank angle of 60°, a radius of less than 0.001 in. at the base, and a depth equal to 15 pct of the cylindrical diameter (removing 50 pct of the cross-sectional area) was found to be suitable for the investigation.

Reliable results could be obtained in this test only by means of a special test fixture. The fixture insures that the direction in which the load is applied coincides with the specimen axis, within less than 0.001 in. eccentricity. Such axial loading also requires that the specimens be carefully ground to the finish dimensions under the buttonhead.

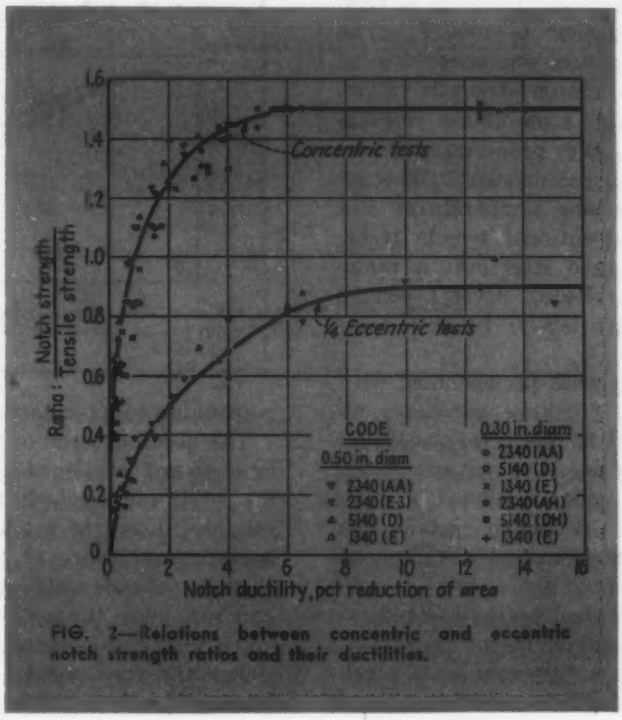


FIG. 2—Relations between concentric and eccentric notch strength ratios and their ductilities.

To fully harden various low alloy steels, the specimen had to be kept rather small, with a cylindrical diameter of 0.300 in. for the alloy steels and 0.212 in. for the carbon steel, see Fig. 1. A larger specimen was used to test the susceptibility of several steels to incomplete hardening, or slack quenching. A number of 0.312-in. diam specimens were cut from larger sections, up to 1¼ in. diam, after heat treating. In all instances, the finish machining resulted in a specimen having a notched section concentric with its outside contour to within ±0.0005 in. To eliminate any decarburization at the notch base, which increased the test values, grinding to finish contour was performed after tempering.

Specimens for the bulk of the investigation were prepared from ¾-in. diam hot-rolled rod. The procedure was as follows: (a) Standardizing heat treatment, (b) preliminary machining, (c) quenching and tempering, and (d) finish machining. The heat treatment consisted of heating for ½ hr at 1650° to 1700°F, followed by air cooling.

The specimens were austenitized, after preliminary machining, for 1 hr at the following temperatures: SAE 2340, 1500°F; SAE 5140, 1550°F; SAE 1340, 1500°F; and SAE 1050, 1475°F. They were then quenched into an air lift tank containing one of the following media: (a) quenching oil, kept at a temperature between 90° and 120°F, (b) 10-pct brine, between 70°

COMPOSITION OF INVESTIGATED STEELS*

Chemical Composition, Pct

SAE No.	Code	C	Ni	Cr	Mn	Mo	Si	P	S	Al	Make	Grain Size
2340	AA	0.42	3.55	0.06	0.86	0.019	0.27	0.005	0.015	0.026	El. Furn. (35 tons)	8
2340	AH	0.40	3.34	0.11	0.89	.....	0.31	0.021	0.011	0.005	Ind. Furn. (1000 lb)	7 to 8
5140	D	0.38	0.025	1.00	0.68	0.003	0.15	0.011	0.021	0.031	O. H. (120 to 140 tons)	7 to 8
5140	DH	0.41	.....	1.04	0.90	.....	0.27	0.014	0.017	0.003	Ind. Furn. (1000 lb)	5 to 6
T-1340	E	0.40	0.098	(0.14)	1.80	0.004	0.23	0.018	0.021	0.024	O. H. (120 to 140 tons)	8
T-1340	EH	0.40	0.050	0.11	2.06	.....	0.40	0.013	0.019	0.002	Ind. Furn. (1000 lb)	4 to 7
1050	G	0.51	0.056	0.32	0.88	0.007	0.22	0.013	0.025	.....	O. H. (120 to 140 tons)	8

* Cleanliness, judged from quantity and distribution of nonmetallic inclusions apparent in the microstructure, is nearly identical for all steels.

and 90°F, or (c) 10-pct caustic soda solution, between 70° and 90°F. Those specimens which were cold-treated were immersed immediately after quenching in liquid nitrogen and kept there for 10 min in order to transform retained austenite.

All specimens were tempered for 1 hr at temperatures ranging from 300° to 1000°F. The lowest tempering temperature was selected so as to obtain consistent, maximum strength values. It also served to eliminate some of the residual stresses which render the properties of as-quenched steels low and inconsistent. The selection of further tempering temperatures was based on results of conventional tensile tests; these were spaced for each steel over a range of temperatures that yielded several tensile strength values (strength levels) between 150,000 and 275,000 psi.

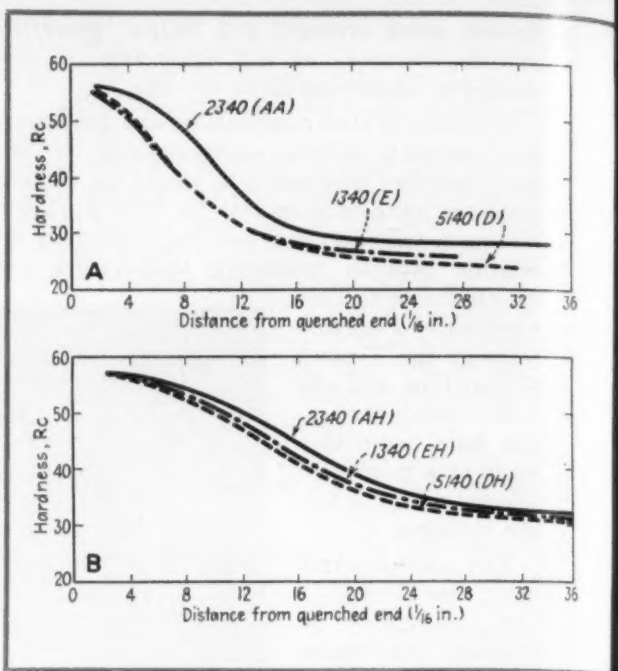
Most of the specimens were premachined with approximately 0.005-in. finishing allowance all around and with a notch radius of 0.010 in. These were finish machined by grinding the cylindrical section and under the head, and by cutting the notch with a cemented carbide tool that was repeatedly sharpened to a radius of 0.001±0.0005 in.

The notch ductility of steel decreases continuously with increasing strength or hardness. This change proceeds at a fast rate from notch ductility values considerably over 10 pct at a strength of 150,000 psi, or hardness of 300 Bhn, to values below 2 pct at a strength somewhere between 200,000 and 250,000 psi, depending upon the particular steel and its particular heat treatment.

With further increasing strength, the notch ductility decreases, in some instances still rather rapidly, in other instances more gradually, to reach values of less than 1 pct at a strength level of 300,000 psi or higher. In the high hardness range a shallow maximum is occasionally obtained, generally corresponding to a tempering temperature of approximately 400°F.

The dependence of notch strength upon hardness also follows a universal, but more complex pattern. Up to a tensile strength of 175,000 psi, or hardness of 350 Bhn, the notch strength of a steel is nearly proportional to the tensile strength; for a 50 pct notched specimen, it is nearly 1.5 times the tensile strength.

With further increasing hardness, the notch strength deviates from this relation to lower values at a continuously faster rate; it passes through a maximum at a certain strength or hardness which varies greatly for different steel compositions and heats. The notch strength then decreases and frequently becomes very low at very high hardnesses. In certain instances a second maximum has been observed to occur corresponding to a tempering temperature of 400°F.



The peculiar trend of the notch strength is related to and explained by that of the notch ductility. If the notch ductility exceeds a value of roughly 10 pct, the notch strength has the fundamental significance of a maximum load stress. It then depends only upon the tensile strength and not upon the notch ductility. But if the notch ductility is small, the notch strength assumes the fundamental meaning of a fracture stress. It is then related to both tensile strength and notch ductility. This explains the maximum in notch strength values that usually coincide with a notch ductility of approximately 4 pct for the heat-treated steels.

The relation between notch strength and notch ductility can be made more definite by using the ratio between notch strength and tensile strength rather than the tensile strength itself. This eliminates the effect of tensile strength and thus brings all heat-treated steels to a common denominator. The relation between notch strength ratio and ductility in Fig. 2 is, then, the stress-strain curve of sharply notched, heat-treated steel specimens, reduced in such a manner that their maximum load stress coincides.

Eccentric notch bar tests have become particularly popular for the testing of mild steel plate. The major characteristic of the eccentric test which distinguishes it from the concentric test is a different range of sensitivity. At high eccentricities, the metal flows under small loads. However, the plastic flow gradually eliminates the eccentricity and the specimen behaves exactly like a concentric specimen if the ductility is greater than a certain value, depending upon the notch contour and the eccentricity. As a consequence, the eccentric test is especially suited for differentiating between steels that possess notch ductilities between 2 and 10 pct, where the

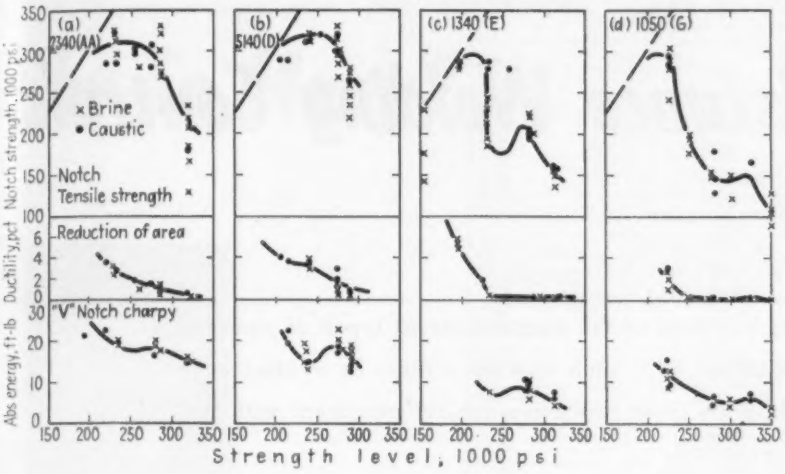


FIG. 4 (above)—Notch properties of brine and caustic quenched 0.30-in. diam specimens of the commercial heats.

FIG. 3 (at left)—Hardenabilities of (A) the commercial heats and (B) the experimental heats investigated, as determined from the ASTM end quench tests.

concentric notch test becomes rather insensitive, as seen in Fig. 2.

Wide variations in notch strength, notch ductility and impact energy were encountered in the present investigation, which included a variety of nickel, chromium, and manganese steels, as well as one 0.50 pct carbon steel. All these steels possessed sufficient hardenability to yield a fully hardened, or martensitic, structure free from ferrite, pearlite, or other decomposition products on either brine or caustic quenching of sufficiently small notched specimens. In the case of the nickel steels, the structure was also martensitic after oil quenching.

Up to a hardness of about 350 Bhn, the notch strength of all these steels (for any given hardness or strength) was found to be practically constant, or well within the ± 7 pct considered as normal variation for the conventional tensile strength. Somewhat larger variations were found to occur in either the notch ductility or the impact energy.

At higher hardnesses or strengths, however, the variations between different steel compositions and heats assumed very large values. This was particularly true at strengths over 200,000 psi. The spread in notch strength observed so far was over threefold, and that in notch ductility and in impact energy was almost tenfold.

Among the steels available for this investigation were a number of steels with a nearly equal carbon content of 0.4 to 0.5 pct, but differing in the alloy and in steelmaking practice. The chemical composition and some other data for these steels are assembled in the accompanying table, and their hardenability curves are presented in Fig. 3.

In order to obtain a basic structural condition for all the steels, it was necessary to resort to very small specimens having a cylindrical diameter of 0.30 in., as well as to radical quenching, either in brine or in caustic soda solution. The structure desired was a fully martensitic one.

The subsequent discussion of the properties relates to heats of four different steel compositions that were produced by common, commercial steelmaking practices.

The four commercial steels considered (see table) are the nickel SAE 2340 steel AA, the chromium SAE 5140 steel D, the manganese SAE 1340 steel E, and the carbon SAE 1050 steel G. The results of the notch tests on brine and caustic quenched specimens of these steels at various strength levels are assembled in Fig. 4.

The nickel steel, Fig. 4a, and the chromium steel, Fig. 4b, exhibited only slight differences in the properties of the fully martensitic structures, primarily in their impact energy values. These differences were found to be consistent and therefore characteristic for the two steels.

Both the manganese steel, Fig. 4c, and the carbon steel, Fig. 4d, showed, with increasing strength or hardness, a very sudden decrease in the notch strength and notch ductility if the hardness exceeded approximately 450 Bhn. Furthermore, at a hardness of 500 Bhn, corresponding to a strength of 250,000 psi and a tempering temperature of 550°F, the notch strength, notch ductility and, particularly, the impact energy of the manganese steel exhibited pronounced minima. In this hardness or strength range the manganese steel was not only very inferior to the nickel steel and the chromium steel, but even inferior to the 0.5 pct C steel.

In Part II of this article, scheduled to appear next week, the authors discuss effects of steelmaking, cold treatment and slack quenching. Further data on notch properties are presented.—Ed.

[1] *E. J. Ripling and L. J. Ebert, "Strength Limitations in the Use of SAE 4340 Steel Forgings," The Iron Age, Aug. 5, 1948, p. 88.*

[2] *G. Sachs, J. D. Lubahn and L. J. Ebert, "Notched Bar Tensile Test Characteristics of Heat Treated Low Alloy Steels," Trans. ASM, vol. 33, 1944, p. 340.*

[3] *G. Sachs, J. D. Lubahn and L. J. Ebert, "The Effects of Notches of Varying Depth on the Strength of Heat Treated Low Alloy Steels," Trans. ASM, vol. 35, 1945, p. 517.*

[4] *G. Sachs, L. J. Ebert and W. F. Brown, "Comparison of Various Structural Alloy Steels by Means of the Static Engrs.," Iron Steel Div., 1947, p. 605.*

[5] *G. Sachs, L. J. Ebert and W. F. Brown, "Notch-tensile Characteristics of a Partially Austempered, Low Alloy Steel," Trans. AIME., Iron Steel Div., 1948.*

[6] *P. Payson, A. E. Nehrenberg, "New Steel Features High Strength and High Toughness," The Iron Age, Oct. 21, 1948, p. 64; Oct. 28, p 74.*

[7] *G. Sachs, "Properties of Heavy Forgings," Steel, Apr. 6, 1942, p. 76.*

Resistance Welding Controls—

A knowledge of the functions of the many different types of welding controls helps understand why such a wide variety is available. It also helps in selecting the least expensive control consistent with the requirements of a given job.

THE user faced with the problem of selecting a control for a specific resistance welding installation may well ask why so many different controls? An imposing array of controls has been developed to meet the needs of modern industry. These range from the simplest line contactor to laboratory controls having multiple sequencing functions and paralleled ignitron contactors with a current capacity of thousands of amperes.

Naturally each user wishes to obtain the least expensive control which will adequately fulfill his requirements for weld quality, speed, welding power and mechanical arrangement. To be able to select the proper control he should have as much information as possible about what these knobs do.

Just what these knobs do can be presented in chart form, grouping all control functions into these categories: Current switching, firing and current control. sequencing, weld treatment and demand reduction systems.

Various combinations of control functions available as integral units under a given NEMA type number are shown in Table I. NEMA standards have not yet been set for all these controls. However, the numbers in this table are a logical extension of the NEMA numbers in such cases. This table lists a number of the functions, and combinations of functions, which can be obtained as a given NEMA type number of control in a single enclosure.

There are many variations which have been omitted, such as the inclusion of breakers and disconnect switches in the control enclosure, special flash welding controls, etc., but this list includes the standard functions and combinations which will satisfy the large majority of control requirements.

Current Switching Functions

The basic control function, in some form a part of every control, is switching of the welding current. This is almost always handled by two electronic tubes connected in inverse parallel as an electronic contactor. Electronic tubes permit noiseless switching with no mechanical moving parts, long trouble-free life, and synchronous starting and stopping of the welding current. They also give a wide range of current control by means of delayed conduction during each half-cycle of welding current. Current control is often called heat control. For the switching of current in small welders such as bench machines, air-cooled thyratron tubes are employed. The switching of heavier currents requires the use of water-cooled ignitron tubes.

Firing and Current Control Functions

An ignitron requires a controlled flow of power or firing current through its ignitor to start conduction. When synchronous starting or delayed-firing current control is not desired, the least expensive method of firing is with a dry-type rectifier.

Heat control devices perform the firing function, and, in addition, offer the user stepless welding current adjustment between transformer

Why So Many?

By W. E. LARGE
Electronic Control Engineering Dept.,
Westinghouse Electric Corp.,
Buffalo

taps. Stepless accurate adjustment is possible over a 5 to 1 range for any transformer tap setting.

Certain critical welding jobs require that the welding current be maintained constant to a degree beyond the usual limits of line voltage variation or material thickness and resistivity. Also, the introduction of steel into the throat of a welding machine can raise its electrical impedance enough to seriously affect the current. For these applications the current regulator has been developed.

To compensate for line voltage variations only, a voltage compensator is recommended.

Sequencing Functions

The widest choice of functional combinations is apparent in the sequencing controls, since these must apply to all types of welding machines. For some machines only control of the mechanical operation of the machines is necessary.

The high-speed sequence timer shown in Table IV will fully control 600 welds per min using a suitable gun welder.

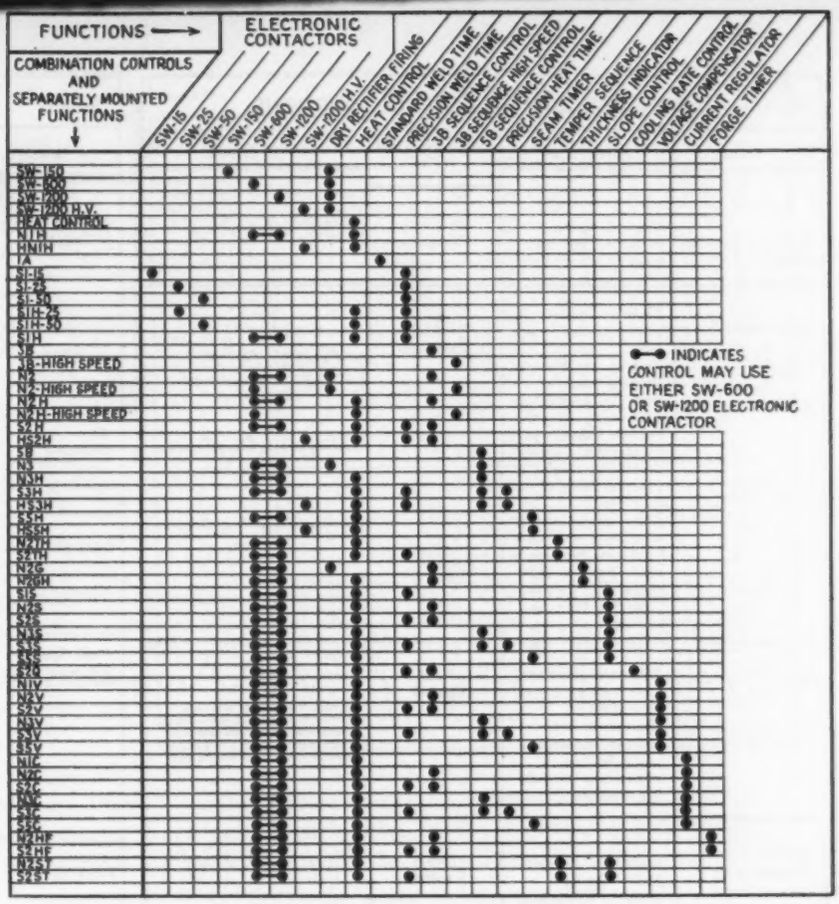


TABLE II — CURRENT SWITCHING FUNCTION

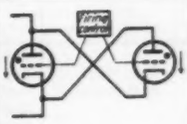
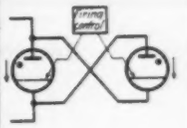
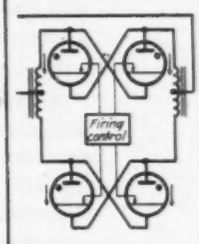
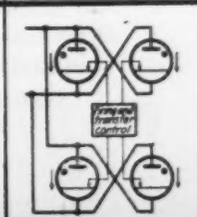
TYPE	FUNCTION	RATING	ENCLOSURES	TUBES	CIRCUIT
SW-15	Noiseless, precise switching of welding current. Transient-free starting and stopping with wide range of stepless current control when used with heat control function.	110 v. to 600 v.	Combination with Weld Time.	Thyratron WL-5684	
SW-25		220 v. to 600 v.	Combination with Weld Time, with or without Heat Control.	Thyratron WL-5685	
SW-50		220 v. to 600 v.	Combination with Weld Time, with or without Heat Control.	Thyratron WL-5665	
SW-150		220 v. to 600 v.	Separate enclosure for tubes with Rectox firing.	Ignitron Size A Type WL-5550/681	
SW-600		220 v. to 600 v.	Separate for tubes with Rectox firing, and combination to mount tubes and all combinations of other functional panels.	Ignitron Size A WL-5550/681; B WL-5551/652; C WL-5552/651	
SW-1200		220 v. to 600 v.		Ignitron Size B WL-5551/652; C WL-5552/651; D WL-5553/655	
High Voltage SW-1200		600 v. to 2300 v.		Ignitron Size B WL-5551/652; C WL-5552/651; C WL-5554/679; D WL-5553/655; D WL-5555/6538	
Parallel Tube Ignitron Contactor	The current is divided evenly and continuously between each pair of tubes. These contactors perform the same function as the SW Series. They are designed for loads which exceed the capacity of a single set of tubes.	440 v. to 2300 v.	Special for each application.	Ignitron Size D WL-5553/655; D WL-5555/6538	
"Flip-Flop" Ignitron Contactor	The current is transferred alternately from one set of tubes to the other.	220 v. to 600 v.	Separate enclosure for one pair of ignitrons and combination enclosure for other tubes and transfer function.	Ignitron Size D WL-5553/655	

TABLE III FIRING AND CURRENT CONTROL FUNCTIONS

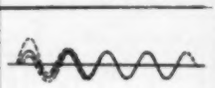
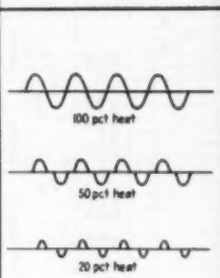
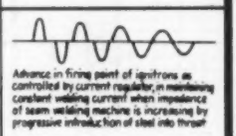
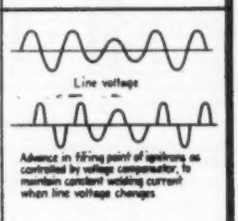
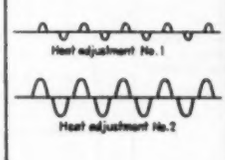
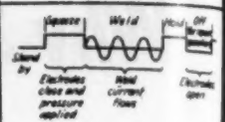
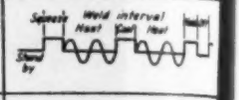
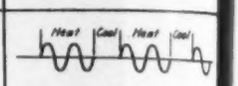
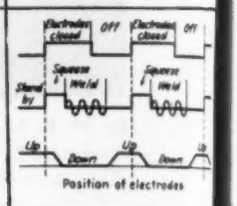
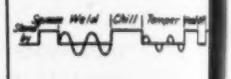
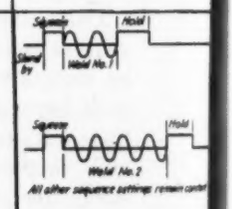
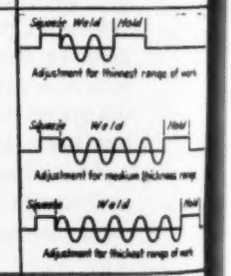
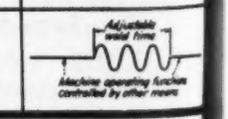
NAME	FUNCTION	MUST BE USED WITH	WAVE SHAPE
Dry-Type Rectifier Firing	Controls ignitor power to fire ignitrons	Electronic Contactor	
Heat Control	Controls ignitor power to fire ignitrons. Assures synchronous starting and full cycle of conduction of welding current. Permits wide range of stepless current control by means of delayed firing of ignitrons. Allows use of current regulating and weld treatment functions which depend upon phase shift delayed firing for their operation.	Electronic Contactor	
Current Regulator	Maintains constant RMS welding current regardless of changes in line voltage, material being welded, or impedance of welding machine.	Heat Control	
Voltage Compensator	Maintains constant RMS welding current, compensating for changes in line voltage only.	Heat Control	
Dual Heat Attachment	Permits choice of two different heat control settings (welding currents) for welding different jobs on same welding machine, where sequencing function adjustments are the same. May be operated by two foot switches, or by selector-switch.	Heat Control	

TABLE IV SEQUENCING FUNCTIONS

NAME	FUNCTION	MUST BE USED WITH	OPERATION SEQUENCE
3B Sequence Timer	Controls mechanical operation of welder, including lowering, application of pressure to, and raising electrodes. Times period of weld current flow, and time between welds for repeat operation. Either standard or precisely accurate weld timing.	Electronic Contactor with or without Heat Control	
5B Sequence Timer	Same as 3B, except weld time controlled to give multiple impulse welding current.	Electronic Contactor with or without Heat Control	
Seam Timer	Supplies precision-timing of heat and cool periods for seam welding. No mechanical functions.	Electronic Contactor with Heat Control	
High Speed Sequence Timer	Controls mechanical operation of welder and weld current timing to minimize effect of lag in operation of electrode pressure solenoid valve. Primarily for use with gun welders designed for high speed operation.	Electronic Contactor with or without Heat Control	
Tempering Sequence	Controls mechanical operation of welder and times intervals of welding current, chill time and tempering current for weld treatment. Provides adjustment for different currents for weld and temper periods.	Electronic Contactor with Heat Control	
Dual Weld Attachment	Permits choice of two different weld times for welding different jobs on same welding machine, where other sequencing function settings can remain the same. May be operated by two foot switches, or by selector switch.	Sequencing Function	
Ti-Matic Thickness Indicator	Automatically gauges thickness of work between electrodes and selects one of three preset weld times to give proper timing for that thickness. All other sequencing function settings remain constant.	Sequencing Function	
Weld Time Function	Times period of weld current flow only, with no machine operating functions.	Electronic Contactor with or without Heat Control	

Resistance Welding Controls

Continued

Weld Treatment Functions

In the welding of some metals it is desirable to preheat or anneal the work. A tempering sequence provides this type of operation as well as normal sequencing of the machine.

Recent experience indicates that a gradual rise in current at the beginning of the weld reduces spitting, gives better contact of the weld surfaces, reduces tip pickup and greatly increases tip life, especially for such metals as aluminum. Slope control provides this feature.

Reduction in cracking and weld hardness is obtainable by controlling the rate at which the weld cools. The cooling rate control allows such control of cooling.

Grain refinement and other improved weld qualities can be produced by the sudden application of a high electrode pressure near or just after the end of weld time. The forge timer controls the time at which this pressure is applied.

The high instantaneous demand currents and normally low power factors of single phase welding machines have resulted in the use of several

TABLE V **WELD TREATMENT FUNCTIONS**

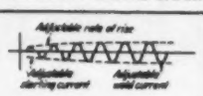
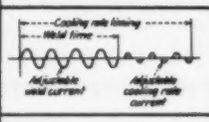
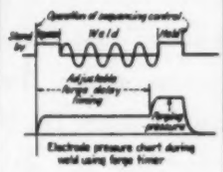
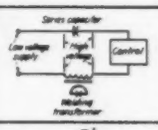
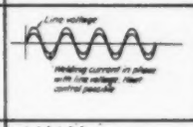
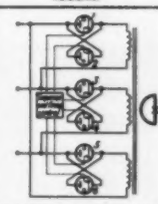
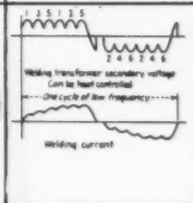
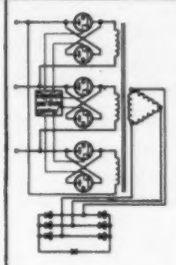
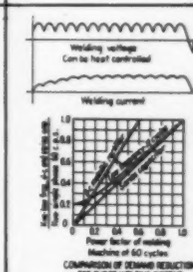
NAME	FUNCTION	MUST BE USED WITH	WAVE SHAPE OR ELECTRODE PRESSURE CHART
Slope Control	Controls current to give gradual increase from low current at start of weld to full welding current.	Electronic Contactor with Heat Control	
Cooling Rate Control	Reduces current at end of weld to obtain slower cooling of weld nugget.	Electronic Contactor with Heat Control	
Forge Timer	Controls forging pressure solenoid valve to apply increased pressure to weld at adjustable time during or after weld. Standard forge timer operates relay which controls solenoid. Precision forge timer operates solenoid valve directly, eliminating variation in timing due to relay operation.	Electronic Contactor and Sequencing Control, with or without Heat Control	

TABLE VI **DEMAND REDUCTION SYSTEMS**

TYPE	MECHANICAL FORM		WAVE SHAPE
Series Capacitor Power Factor Correction	Separate capacitor bank. Combination control enclosure. Special welding transformer required.		
Three Phase to Single Phase Low Frequency Converter System	Combination control enclosure. Special welding transformer required.		
Metallic Rectifier dc System	Combination control enclosure. Rectifiers mounted in welding machine. Special transformer required.		

control systems designed either to improve the power factor, thus reducing the demand, or to both improve the power factor and spread the load over a 3-phase supply.

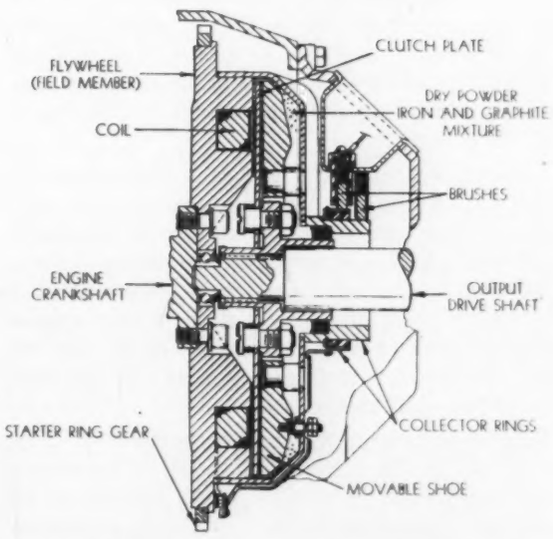
The systems described in Table VI can all be provided with most of the sequencing and current control functions outlined for single phase control.

Iron-Graphite Powder Used in New Clutch

GRAPHITE joins with iron powder as the power-transmission medium of new electromagnetic clutching and braking devices developed by the Eaton Mfg. Co. of Cleveland. Graphite is normally considered a lubricant for reducing friction, but in this patented iron-graphite mixture the graphite is employed to produce friction without wear.

Electromagnetic devices of this type operate on the principle of contact between the driving and driven disks through the powder medium. The power conducting ability of the powder depends on the magnetizing electric current. With no current, the powder is loose between the disks. As current is increased, the powder increasingly "stiffens" as it becomes magnetized, carrying power between the disks with less and less slip. At full current, the powder in effect becomes a solid connection between the two disks, carrying rated power without slip. To the normal features of magnetic clutching and braking devices, the unique combination of iron and graphite powders adds those of insignificant wear, and freedom from drag.

Eaton's devices will be built in two types: with a fixed air gap, and with a variable air gap. The latter type is, in effect, a disk-plate clutch with the graphite-iron powder forming the friction lining of the disks. The fixed air gap type will be used mostly for constant slipping, modulating, or retarder applications. The variable air gap type is recommended for smooth braking or clutching.



FOR AUTOMOTIVE applications, Eaton has designed this variable air gap type of electromagnetic clutch.

Metalworking Research

By DR. CHARLES N. KIMBALL
President,
Midwest Research Institute,
Kansas City, Mo.

Even the smaller nonprofit research organizations such as Midwest are well equipped in a number of different fields. This institute operates a highly specialized precision gage laboratory and ceramics is another part of their ever-increasing scope. Small companies are extremely active in this area. The present Midwest facilities number 120 technicians and six buildings.

METALLURGICAL research is proving its worth repeatedly to project sponsors at Midwest Research Institute, Kansas City. Utilization of Midwest's extensive metallurgical equipment has enabled this organization to produce superior results at a minimum expense and a maximum profit potential. Annual dollar volume of research done at Midwest is in excess of $750,000.

The Midwest Research Institute is a nonprofit institution. Financially speaking, it is concerned only with seeing that the income from its research operations meets the expense of doing the research. Charges to sponsors of projects follow the pattern used by similar scientific nonprofit institutions and foundations in other parts of the country.

The duration of the program determines the cost to the sponsor. On long-term projects, personnel time can be distributed more efficiently and the use of equipment can be allocated more definitely. The total cost to the sponsor on a long-term program consists of the cost of special equipment and materials required by the project, the charges for staff salary plus 100 pct surcharge on staff salary.

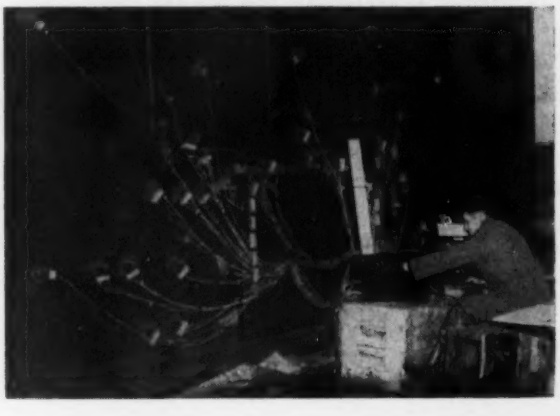
Short-term projects are more extensive to integrate into the schedule of Institute operations and seldom require the full time assignment of personnel to their operations. The surcharge assessed on short-term programs is 125 pct of staff salary costs.

Definite advantages and savings occur to sponsors who use facilities outside their own organization, such as those of the Institute. At the conclusion of the research program, they have no further liability to the research organization. The expense of setting up and dismantling temporary laboratory facilities has been avoided. The basic equipment of the laboratories has been available without charge. The composite skills and knowledge of the technical staff have been at their disposal. There has been no interruption in the performance of the regular work of their own personnel. These are all very definite cost savings which are attractive to management.

Several metal forming methods which have met with success in pilot plant stages have resulted from the metallurgical research programs at the Institute. Among these is the development of a process for centrifugal casting of curved four-color printing plates. Plates now being used on two magazines of large national circulation are produced by this method which materially reduces misregister in the multicolored printing and results in improved press life.

As in all phases of research development, prog-

STUDIES IN STRESS CONCENTRATION are facilitated by this installation of more than 120 electric strain gages. This particular problem involved the investigation of failure in crude oil storage tanks which developed areas of severe stress. Conducted at one of the sponsor's pumping stations, the tests resulted in recommendations for change in design which would eliminate the source of the strain.



Reaches All-Time High

MIDWEST RESEARCH INSTITUTE
—Third of a Series—

ress is dependent upon the tools and skills available. The Institute staff of more than 120, including a physics and metallurgical department utilizing the services of a dozen highly specialized scientists, provides the necessary depth of technical talent.

A complete laboratory, occupying one of the six Midwest Research Institute buildings, includes facilities for mechanical sample preparation, electropolishing, special studies with metallurgical light microscopes, and X-ray diffraction investigations, plus an electron microscope.

Hardness testing and physical testing equipment, in addition to heat treating furnaces, including high-precision testing machines and special purpose furnaces, are important in operations of the Institute's intensely active metallurgical department.

The Institute maintains a chemical laboratory equipped for all types of analytical studies, and also a Dietert spectrograph with standards for quantitative determination of alloys. An ore dressing laboratory, equipped for crushing and grinding, screen analysis, and some types of ore concentration work, is another phase of metallurgical operations at Midwest.

A photographic laboratory with equipment for high-speed motion pictures and for macroscopic and microscopic work supplements the operations of the metallurgists. Housed in another Midwest building is a completely adequate machine shop for construction of special research aids, and for cutting and preparation of metallic specimens.

Midwest Research Institute also operates a precision gage laboratory, containing over $100,000 in technical equipment, most of which has been allocated by U. S. Army Ordnance. This laboratory is valuable in metallurgical studies and is used as a complementary medium of investigation by Institute reseachers.

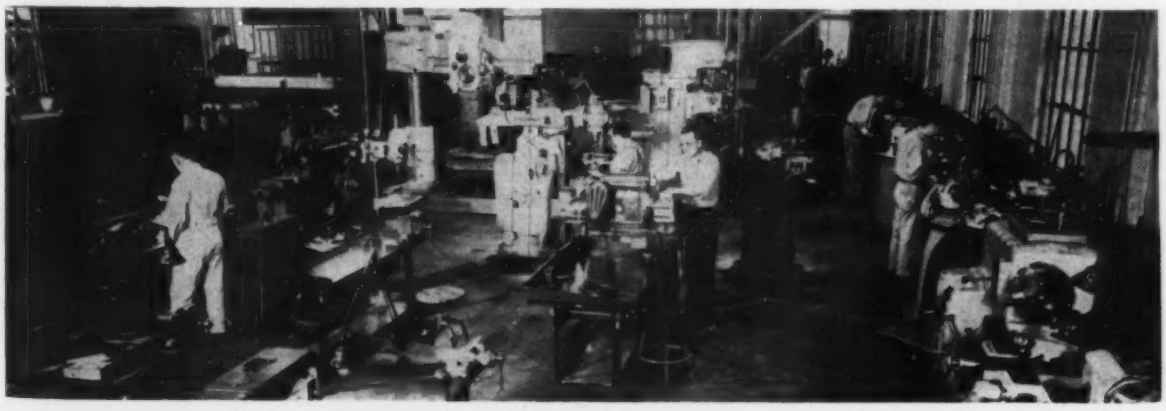
Ceramic research is another part of the ever-increasing scope of operations at Midwest. Specialists in this field have participated in studies of glass fibers, natural resources of the area, and other related subjects.

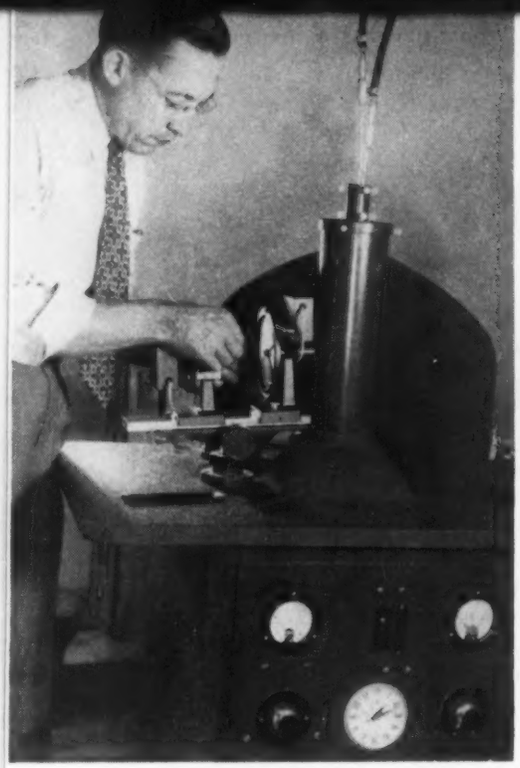
Average Size of Sponsors

Average size of concerns for which Midwest Research has conducted investigations is best understood when the maximum and minimum size of projects is presented. Projects which involved study over a long period of time, at a cost to the sponsor of nearly a quarter of a million dollars, have been conducted in the Institute's laboratories simultaneously with studies for smaller sponsors, which amounted to a few hundred dollars.

Among the numerous projects undertaken by

EXTENSIVE MACHINE SHOP facilities are maintained at Midwest Research Institute.





INSTITUTE SCIENTIST conducts experiments utilizing X-ray diffraction equipment, as supplementary medium to metallurgical facilities.

Metalworking Research

Continued

Midwest Research Institute in behalf of smaller companies, were included many problems in the metallurgical field. These arose from basic problems in the area of applied metallurgy or from problems involving unusual conditions of strain. Midwest Research Institute is in a good position to handle investigations of this type through its extensive stress analysis facilities which supplement the regular metallurgical operations. Specific illustrations of projects for smaller companies follow.

One problem involved the study of crankshaft sleeves, which were being installed on crankshafts of diesel engines by a small firm. Institute scientists developed newer, more practical shapes for the edges of the crankshafts and sleeves which would withstand stresses in proper range for the particular metal being used.

In another problem, the Institute participated in a study of welds, and it was ultimately proven that failure of particular welds was due to improper design, rather than imperfect welding methods.

The Institute also conducted studies for a small manufacturer which involved the investigation of metal finishing. Specifically, this finishing related to chrome plating on aluminum casting, where it was possible to show that porosity was carried through the subsequent plate of aluminum. This was first corrected by a change in plating techniques; and finally by a change in casting methods.

An example of studies conducted by the Institute, was the study of baked enamel finish. It was shown that blisters occur in enamel where it is directly related to the surface condition of the metal.

A study of unusual corrosion conditions in roller bearings was undertaken for another small company. An unsuspected induced electrical potential condition was found. The project corrected and eliminated the corrosion troubles.

The above examples were conducted for firms that employ from 50 to 100 men. Thus the small businessmen in the metalworking plants are taking advantage of large research facilities that they cannot possibly afford to own or operate themselves.

Midwest Research has served many organizations and has completed successfully many research assignments. It also provides additional facilities and specialized personnel for the solution of problems of large organizations which themselves maintain extensive research departments. It also serves other companies which have no research facilities and which depend entirely upon the Institute for assistance on technical problems.

Emphasis On Metallurgy

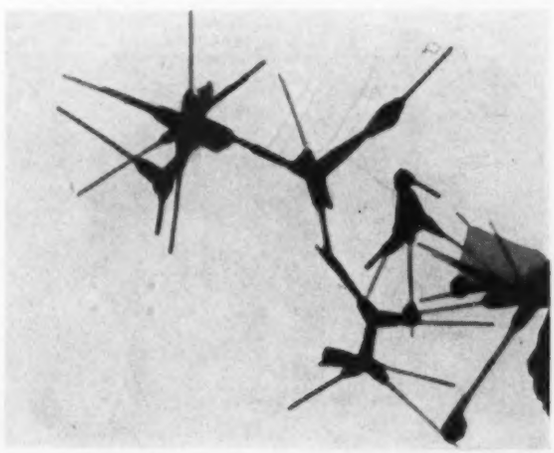
With particular reference to metallurgical problems, Midwest is well qualified to conduct studies in the heat treatment of ferrous and nonferrous metals, nonferrous alloys, corrosion and physical metallurgy.

In addition, industrial furnace design problems and structure fabrication studies are other phases with which Midwest scientists are familiar through active interest and practice in the field.

Problems in smelting and refining, ore preparation, inspection and control, cleaning and finishing, and general foundry are still other activities in which Institute technicians are most proficient.

An average of 12 to 15 projects annually involving the use of metallurgical facilities at Midwest serves to emphasize the important aspects of this type of research on industrial progress.

PHOTOMICROGRAPH of zinc oxide smoke. Ordinarily invisible under a regular microscope, the electron device photograph shows clearly the formation of the zinc smoke.



Portable Ingot Stripper Offers Flexibility

A 250-ton ingot stripper which can be suspended from a crane hook is proving successful in steel plant operations. It's cheaper and more flexible than conventional equipment.

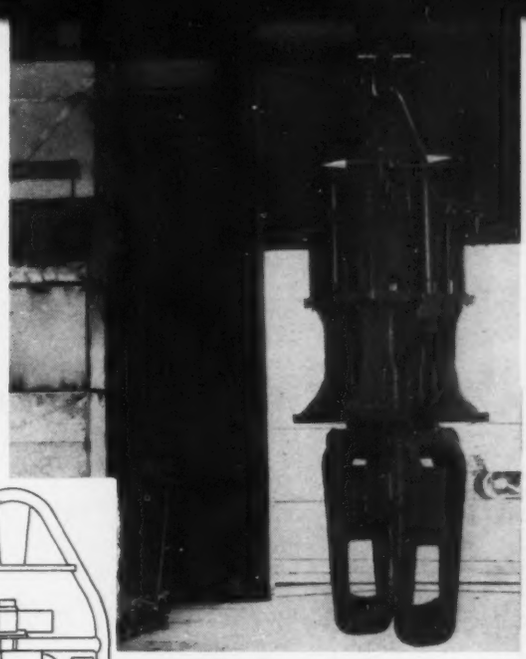


FIG. 1—The portable stripper is made by Pittsburgh Engineering & Machine Co. Hung from a crane hook, it can be easily moved and used on any part of the floor over which the crane operates.

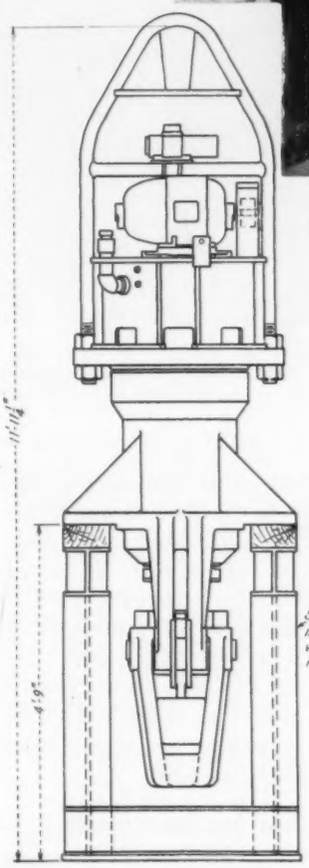


FIG. 2—Drawing of the portable stripper resting on a stand when not in use. The total maximum stroke of the hydraulic ram is 18½ in.

ORDINARILY ingot strippers entail large investments for a lot of heavy equipment. For some time small shops have needed smaller, cheaper strippers not only because of lower prices, but also for added flexibility. Recently a portable stripper was put in service and experience now shows it is working well and has successfully met operating requirements.

A portable 250-ton ingot stripper which is suspended from the hook of the service crane is giving economical and efficient service at Rotary Electric Steel Co. in Detroit.

Use of the portable stripper unit in conjunction with the service crane gives Rotary flexible crane and stripper service with a minimum investment in equipment. The ingot stripper was designed and built by Pittsburgh Engineering and Machine Co., Division Pittsburgh Steel Foundry.

As shown in Fig. 1, the portable unit is suspended from the crane hook. This unit contains both the hydraulic power unit and the motor. (Shown at the top of the stripper.)

The stripper shown in the drawing, Fig. 2, can handle a minimum of 37⅝ in. to a maximum of 52 in. over the ears of the mold.

Operational procedure is as follows:

1. Mount stripper on crane hook.
2. Make electrical connection to source of power and control.
3. Hoist stripper above position of rest.
4. Start pump motor by pushing "start" button at point of control.
5. Push and roll "up" button until ram goes to top of stroke, thus opening lifting fingers.
6. Lower stripper over ingot mold and inch "down" button until stripper fingers are firmly affixed over lugs on mold.
7. Hoist stripper and mold to sufficient height to facilitate ejection of ingot from mold.
8. Push "down" button and hold until ingot is stripped. Release "down" button.
9. Lower mold to floor.
10. Push "up" button to retract fingers.

Action of the ram is remotely controlled from the crane operator's pulpit. As soon as the head of the ram touches the ingot, an automatic cut-in-valve turns on the high pressure. The return of the ram is at double speed.

The hydraulic unit, pump motor and valves are mounted at the top of the stripper. This design has the advantage of easy accessibility and also insulates these components from heat.

Where the portable ingot stripper fails immediately to dislodge the ingot, the crane operator may (1) resort to bumping to break the ingot loose, (2) add additional material to increase the effective action of the ram. The installation has a maximum stroke of 18½ in.

The Pittsburgh portable stripper used in conjunction with the service crane is successfully stripping big end down ingots produced by Rotary's five electric furnaces which are rated at 425,000 tons annually.

Plant Models Provide Co

By WALTER G. PATTON
Detroit Editor,
THE IRON AGE

Positioning overhead monorail on one of the Olds three-dimensional layouts. Model railroad track is used to simulate conveyers. This material can be readily bent to the desired shape.

SINCE World War II ended Oldsmobile has added 200,000 sq ft of floor space to its Lansing, Mich., plant, which now comprises 3,300,000 sq ft and covers 98 acres. Three-dimensional model layouts were used in planning all parts of this new construction program, including the new assembly plant completed this year. One of the best-known results of this scale-model planning is the "Rocket" engine plant, acknowledged as one of the most efficient in the automobile industry.

Higher Costs Justified by Results

In the new assembly plant, the use of model layouts made it possible for Oldsmobile engineers to achieve maximum efficiency in planning production flow. This was true of everything from individual machines to inter-related departments, and particularly applied to materials and parts handling and supply. It was possible for the planning staff to call in production foremen and show them, in miniature, exactly how their departments and sections would function. In this way, constructive criticism was obtained based on practical experience, making it possible to eliminate flaws before a single piece of equipment had been placed in position.

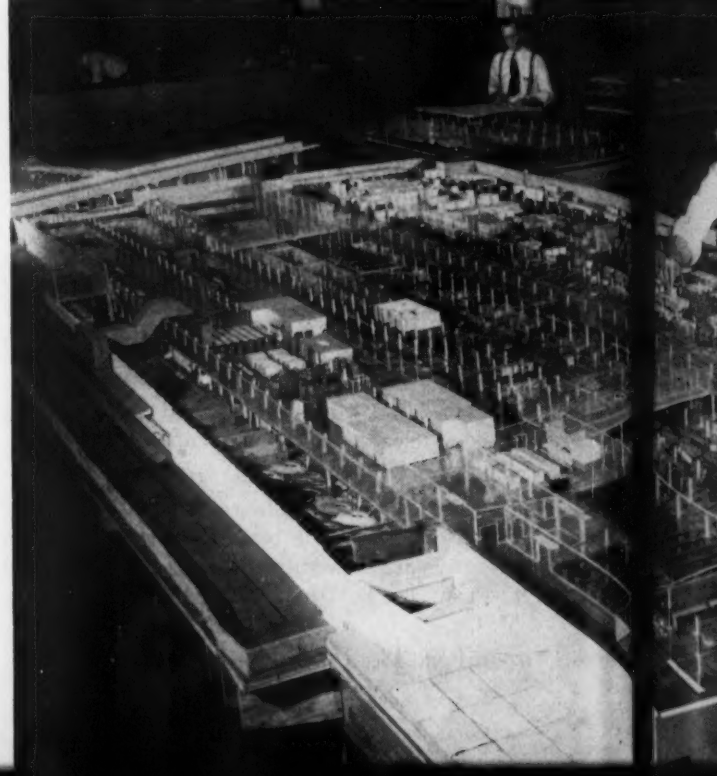
Originally, Oldsmobile used flat, template-type layouts. Layout review meetings have been much more successful since the development of three-dimensional models. Visualizing the finished plant is much easier and analyzing the plan's effect on production flow is more accurate.

Oldsmobile planning engineers think the additional cost of model layouts are insignificant compared to their value in laying out, maintaining and revising automotive plants. It has made it possible to revise already existing equipment layouts, work stations and supply arrangements that would have resulted in lower production and extra handling. These changes can be effected while in the model layout stage by simply shifting one or more models.

The costs of three-dimensional plant layouts can also be spread over a number of years, according to Olds engineers. By keeping them up to date, it is possible to use them to plan changes in production flow required to accommodate new models, new equipment or improved job methods. The company has also learned how to use the models effectively in coordinating its engineering and administrative functions.

Cost of constructing scale models has also been reduced considerably at Oldsmobile. In the beginning some scale models cost as much as $75 apiece. Today, model makers and detailers at Olds can make a scale model of almost any machine in the plant in 2 hr or less. Careful planning and intelligent use of low cost, readily

Scale model layout of new Oldsmobile assembly plant. Layouts for oth[illegible]ds plants



de Continuing Production Aid

All units of Oldsmobile's postwar expansion program were first laid out in miniature. These models have paid off in higher production and more efficient materials handling.

Model maker putting the finishing touches on models. Typical models of machines, made by Olds craftsmen, are shown in the foreground.

available materials have made possible substantial savings. For instance, the model cars used are the "dime store" plastic models costing 8¢ each. About six or eight gross of these have been used thus far. If a fender or a hood is wanted, the model maker simply cuts off the part and hangs it on the miniature conveyers, for which, incidentally, HO gage model railroad track is used. Wheels from the toy cars serve as tires.

Even though experience, ingenuity and know-how can only apply to each individual plant's layout problems, a considerable part of Oldsmobile's experiences with pilot scale models may prove helpful to other manufacturing companies.

From the time when three-dimensional layouts were first adopted for the Olds expansion program, a scale of ¼ in. to the ft has been used. Because this was never changed, it is possible to interchange any unit from any of the various layouts with one another. Models of all major pieces of equipment are held within 3 in. of actual size and contour. Layout tables have been standardized at 4x8 ft, giving a maximum reach of 2 ft. Height of table top is 36 in.

On personnel, the model department supervisor at Oldsmobile says, "A young man who has had experience making model airplanes or cars will usually become a good model maker, but he must be trained for the desired accuracy."

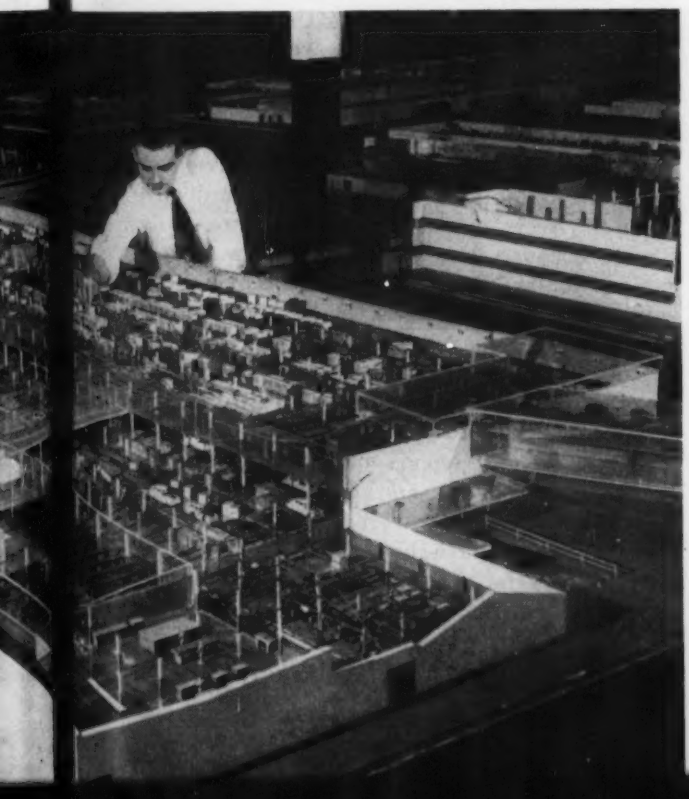
Taking the Oldsmobile shop as an example, model shops need not be elaborately equipped. Power equipment consists of a circular saw, a scroll saw and a belt sander. This is supplemented with an assortment of hand tools. White pine is stocked usually in square sizes of 1/16 in. up to ½ in., and in ⅛ in. sizes above this. Standard length is 18 in.

Plant Details Also Simulated

Since it is as important to allow accurately for the position of plant structural details as for equipment itself, care is also taken to simulate these elements. Structural columns are made of ¼x¼ in. keyway bar stock threaded at one end. A T-nut is screwed on and these columns are then permanently located and secured in place. Second floors are made of transparent Lucite and can be lifted off. Models on this surface are stuck in place with two-way tape. Models on the Celotex ground floor are held in position by common pins, forced into the white pine of which they are made.

All models are painted, the colors corresponding to the standard colors used in the plant. Special color schemes are used to designate machines and equipment on order or contemplated for future expansion. Such models are made by using manufacturers' prints, obtained in advance of the arrival of the machines or equipment. To identify some of the machines or give additional information, cardboard tags are sometimes stapled to the models.

for oth ds plants are shown in the background. Scale: ¼ in. equals 1 ft.



Portable Shear

Handles 1-Inch Rod

By EVANS JASPER
Vice-President,
Manco Mfg. Co.,
Bradley, Ill.

Present models of a newly developed portable hydraulic unit are capable of cutting rod up to 1 1/16 in., cable up to 3½ in., wire rope up to 1¼ in. and chain up to 1 in. in diameter. Semi-portable pump unit connects by flexible hose to cutting head weighing only 38 lb. Operation is simple and rapid. Maintenance costs are extremely low.

MANY industries have felt the need for a portable cutting tool for the larger diameters of rod, bar shapes, chain, bolts, cable and similar material. Now such a tool has been developed. It consists of a small hydraulic pump connected by flexible hose to a reasonably lightweight cutting head. The whole unit is readily portable, and can be operated by one man. In various forms for different industries, the unit will cut rod and bars up to 1 1/16 in. in diameter, wire rope up to 1¼ in., and cable up to 3½ in., in a cutting cycle of 2½ sec. Units of greater capacity may be built.

This cutter was originally developed for cutting coiled hot-rolled rod. Hand tools for cutting small diameters have been in use for many years. But in coiled sizes from ⅜ to 1 1/16 in. problems arise in cutting samples for the laboratory and in removing the cobbled end of the coil.

The equipment available for this service has been, up to the present time, very bulky and ungainly. Large cumbersome alligator shears used on some installations necessitate the moving of coils to the shear to be trimmed and sampled. This method involves excessive handling and is too slow for modern rod mill production. Acetylene cutting torches are undesirable because it is difficult to make a clean cut, particularly if the coil is on a moving conveyer. Also, spatter from the burning and air hardening of some types of rod mean difficulty on subsequent drawing operations by customers. Portable abrasive cutoff wheels are slow, and maintenance on them is high.

Compressed air shears have been designed, but they are bulky and difficult to handle. Mechanical and air-powered shears built for other purposes have been adapted, but they often do not have sufficient pressure for the shearing operation, or the controlling valves

are so complicated that they are difficult to maintain.

Many of the cutoff devices now in use cannot be manipulated to cut off an 8-in. laboratory sample, so that it is necessary to wastefully cut off an entire loop.

The problem of building a shear especially suitable for the high-speed large production mills was brought to the author's company by the rod mill superintendent of a large Midwestern steel mill. In this mill, steel rod in coils is moved by conveyer to the loading docks after leaving the hot mill. They wanted a portable tool, operated by one man, that would cut test samples up to 1 in., and require a minimum of maintenance.

Need Strength and Mobility

This necessitated building a shear that would have the strength of an alligator shear and the flexibility and mobility of the average common bolt cutter. Repair and maintenance costs would have to be kept at a minimum, not so much because of actual cost but because outages have such an adverse effect upon efficient handling of the production of the mill.

This request resulted in the development of the Guillotine cutter. Its hydraulic equipment develops 10,000 lb of pressure and is semi-portable, with power being supplied by either a portable gas engine or a 2 hp electric motor. The special cutting unit, weighing only 38 lb, is connected to the pump by a 25-ft hydraulic hose.

With the pump operating, the operator closes the remote valve by hand pressure, causing the cutter blade to make the cut. Release of the hand valve provides automatic blade retraction. The entire cutting cycle is only 2½ sec. Standby cutting heads can be coupled quickly in place when overhaul or blade sharpening is required.

The cutting cycle requires only a momentary surge of pressure from the pump. The pump, therefore, is not continuously highly loaded, so that maintenance is at a minimum. The head can be furnished with a swivel attachment so that the head can be turned to make left or right hand cuts or up and down cuts. Each cutting head is operated by its own hydraulic pump.

Shear Is Suspended

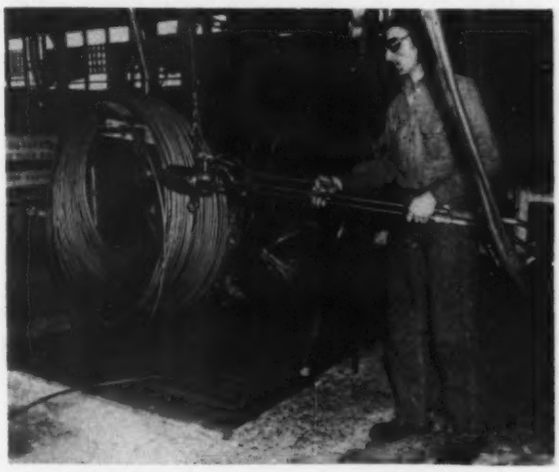
The shear unit in one large rod mill is suspended from a balancer attached to a monorail. One unit is attached to the front of the conveyer line and a second shearing head is mounted in the same manner on the backside of the conveyer line. These shears are able to trim a cobbled end and cut a test sample from each coil of rod, as it moves down the conveyer line, without interruption. Two shears handle a maximum of 65 tons per hr, 24 hr per day with a minimum of lost time and with a very low repair and maintenance cost.

COMPACT PUMP and cutting head of the hydraulic cutting unit. Pump is semi-portable. Head weighs only 38 lb, is portable within limits of flexible hose.

This is the first attempt at applying high pressure hydraulics to rod shearing applications, in maintaining full production on the most modern rod mills in operation today.

Problems of oil leakage under 10,000 psi pressure, breakage of cutting blades under 60,000 lb thrust, and design of a tool capable of withstanding such stresses despite portable size were among the problems overcome in designing this equipment.

In the development of the Guillotine cutter, it was found that a balanced, mechanical type hand valve satisfactory for 10,000 psi hydraulic operation was not commercially obtainable through regular sources. Pressure of 2500 psi is generally considered high in industrial applications. It was necessary to design a special valve in order to permit the operator to control



CUTTING UNIT in use in large rod mill is fitted with extension to keep operator away from hot coils. Cuts are made as coils move by on conveyer.

the cutting operation at a remote distance from the pump.

Special analysis steels for use in springs, forgings and castings were required to permit a compact design of the cutting unit. Considerable research into material fatigue, and oil seal design for effective operation under maximum and minimum pressures, was made over a 4-year period. A typical field of concentration was the problem of operating tolerances. Much vital information was learned about effective clearances under high pressure operation and was used to minimize excessive wear.

Modifications Are Possible

With basic problems solved it has proved relatively simple to modify the various Guillotine units to perform specialized cutting, punching, swaging, riveting and pressing operations for all types of industry, where portability, capacity and compact size of the equipment is advantageous. For example, the laborious hacksaw or expensive cutting torch have been the only means of cutting log chain over ½ in. in diameter. The Guillotine will cut 1 in. diam log chain with relatively little manual effort. In the utility field it is necessary every year to renew thousands of feet of power cable up through 3½ in. diam. In order to salvage the large amount of copper and lead involved, the cable must be cut in convenient lengths for handling. Makeshift power cutters, hacksaws or modified air-operated chipping hammers have not proved economically fast enough. A special Guillotine, using the same high power pump as the rod mill Guillotine, will cut 3½-in. lead sheathed power cable in 2½ sec.

After snaking the power cable out of the manhole, the cutting operation can be carried out by the Guillotine, which in this adaptation operates from a portable air compressor, using 16 cu ft of 100 lb air per min. The short lengths can then be loaded into trucks. Another type, using a gas engine for power and mounted on a portable dolly, can also be used in the field. Still another method is to recoil the used cable on reels as it is removed from the manhole, and return the reels to a central location where a high-speed large unit can be installed. The reels are mounted on a power drive which pushes the cable through the cutting unit against a stop 6 ft away. When the cut is made the short length drops to the ground for truck loading.

In sheet mill operations, quality control requires analysis of the butt weld connecting separate sheets into a continuous strip. A Guillotine, modified for quick punching a ½-in. hole 3 in. from the side of the strip and through the weld, produces a neat slug for testing and eliminates burning a section from the sheet.

In coal mining, the new method of bracing mine roofs by use of 1 in. bolts, driven 2 to 3 ft into the overhead and secured by a steel plate and nut, is eliminating the timber shoring that takes up such valuable space. In mines with low head room the protruding bolt ends must be sheared close to the nut, using hacksaws, as torches are not permissible. A modification of the Guillotine for shearing the 1 in. bolt flush to the nut is in final development stages.

Military May Use It

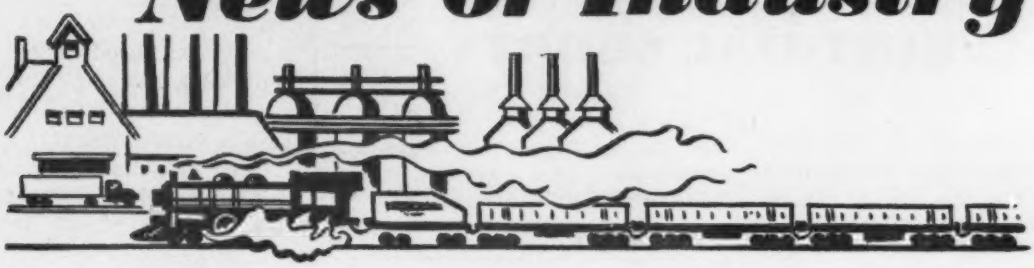
A number of Guillotine units have been made for underwater construction and salvage work. The power unit for these cutters may be an electric motor, a gasoline engine, or even a hand pump. The cutting head may be attached to the power unit by whatever length of hose is necessary, lengths up to 200 ft being in use. The head is often fitted with extension tubing, such as is used to keep the operator away from the heat when cutting hot rod at the mill, to enable reaching high up from the underwater working position. The Navy is interested in this unit for use in cutting submarine nets.

Other uses for this cutting equipment include cutting of reinforcing rod at the job, where it proves much faster than the common method of cutting with a torch. It has also been used as a rivet squeezer in light steel and plate fabrication.

Government Research Mounts

PARTIAL list of expenditures for research and development of a few government departments for 1950 are as follows: AEC, $725 million; Bureau of Standards, $9 million; Navy Research, $42 million; Air Force, $215 million; Regional research laboratories, $5 million; Bureau of Mines, $24 million; NACA, $63 million; Research and Development Board, $1.7 million.

News of Industry



NPA Issues Zinc Order

Washington — The National Production Authority last week issued order M-9 on zinc distribution. The NPA's stated purpose in giving this order is to provide fair distribution of rated orders and to achieve maximum production with a minimum of disruption.

A 30-day lead time is called for and no producer of zinc, zinc dust, or zinc oxide will have to accept rated orders for shipment over 10 pct of his total scheduled production of these items during any single month.

Granite City Plans Expansion

St. Louis—Granite City Steel Co. is expected to embark on a $50 million expansion program soon. It has engaged the New York firm of Coverdale and Colpits to make a study of the program's feasibility.

The expansion would double present capacity to 100,000 ingot tons per month. Granite City completed a $26 million expansion program 2 years ago. A $6 million program now under way will be finished in 1951.

Hanna Plans Giant Ore Carrier

Cleveland—A 690 ft iron ore carrier, biggest inland waterway ship ever constructed, will be built for M. A. Hanna Co. in time for the 1952 ore haul season. The ship, to be built in the Lorain, Ohio, yards of American Shipbuilding Co., will have a 70 ft beam, 37 ft moulded depth, and carry 20,000 gross tons.

Steel's Coke Capacity Grows for Expansion

Industry's report of 9.4 million tons steelmaking expansion seen conservative . . . Now building and repairing coke ovens to meet steel growth pace —*By John Delaney.*

Pittsburgh—The steel industry is quietly increasing its coke oven capacity to keep pace with actual and contemplated expansion in iron and steel producing capacity.

A big job must be done. The industry has advised Secretary of Commerce Sawyer of plans to expand steelmaking capacity by 9.4 million tons and blast furnace capacity by 1,734,000 tons in the next 2 years. This is conservative. It is almost a certainty that actual expansion will be considerably greater. Furthermore, indications are that 4,250,000 tons of added iron capacity rather than the 1,734,000 tons reported will be needed to accommodate an increase of 9.4 million tons of steelmaking capacity. (THE IRON AGE, Oct. 12, 1950, p. 149.)

One Ton Coke, One Ton Steel

For each ton of additional iron capacity, the industry must arrange to deliver slightly less than one ton of coke, although, through use of high quality ore and sinter, some producers are realizing a greater iron yield with less coke.

It is estimated that steel producers this year have let contracts for approximately 400 new by-product ovens, representing a capacity of about 2,240,000 net tons of coke per year. This does not include an extensive program of oven replacement and rebuilding. Greater efficiency of replacements and rebuilt ovens will mean additional yield. Coke oven builders also look for more contract awards before the year is out.

Steps to Meet Needs

Not all of this will represent a net increase in coking capacity. Obsolescence and old oven failures will continue to take their toll. Experience in 1949 is typical. The Bureau of Mines reported coke oven capacity at the close of that year as 73,710,100 net tons, a decline of 789,800 net tons from 1948—despite that 469 new ovens with an annual coke capacity of 2,275,300 tons were placed in operation during '49. Nearly 50 pct of existing slot-type ovens are more than 20 years old.

The bureau reported that even in 1949 the industry was taking steps to meet future coke needs since 562 ovens with a capacity of 3,275,000 net tons were already under construction then. This, plus what has already been contracted for in '50, makes a total of approximately 962 ovens with new capacity of 5,515,000 tons, since built or under construction.

Some believe that coke and iron capacity are now just about in balance. However, as in past periods of high steel production, thousands of beehive ovens, the

INDUSTRIAL SHORTS

K-F BUILDING — KAISER-FRAZER began construction recently of its new $3 million stamping plant at Shadyside, Ohio. Initial capacity of the finished plant will be 3000 tons of finished stampings per month.

NEW DEVELOPMENT—A new baking-type coating intermediate that is expected to form a versatile base for a whole new field of protective coatings, has been developed by the Chemical Dept. of GENERAL ELECTRIC CO., Pittsfield, Mass. Designated as R-108 this new coating intermediate combines outstanding chemical resistance with flexiblity and heat resistance.

OIL PIPELINE — GULF REFINING CO., is planning to purchase right of way for a 150-mile oil pipeline to run from Lumberton, Miss., to Mobile storage tanks to be built on property leased from the Alabama State Docks north or the State Docks' coal tipple.

BRANCH OFFICE — A branch office at 269 Water St. in Augusta, Maine, has been opened by ALLIS-CHALMERS MFG. CO., Milwaukee, under the management of D. P. Appleton.

MOVING—Construction of offices and a warehouse at 2055 South Camfield Ave., Los Angeles, has been started by the ZURBACH STEEL CO. OF CALIFORNIA, INC. A new shear line will be installed and added facilities for leveling and processing sheet and coil stock will be provided.

NAMES AGENT—The Electric Products Co., Cleveland, has appointed the POWER EQUIPMENT CO., Kansas City, as their representative in the western counties of Iowa and Missouri, the panhandle counties of Texas and the states of Arkansas, Oklahoma and Kansas.

MORE FORGINGS — Negotiations have been completed by KROPP FORGE CO., Chicago, for the acquisition from Ordnance Tank Automotive Center of Detroit of its forge plant at Melvindale, Mich. The plant comprises 148,000 sq ft and was formerly occupied by the Timken-Detroit Axle Co.

BEST WISHES—The EUTECTIC WELDING ALLOYS CORP., New York, is celebrating their tenth anniversary this year. A new Engineering Services Building is now under construction at the site of the company's No. 2 plant in Flushing, New York.

DOUBLES CAPACITY—A New England branch plant at Groton, Conn., has been opened by ARWOOD PRECISION CASTING CORP., Brooklyn. The new branch will operate on the same profit sharing plan for employees which is currently in force in the main Brooklyn plant.

ADDS TO LINE—FRIEL DETROIT CO., Detroit, has signed a distributorship agreement to sell and service Worthington Pump & Machinery Corp. air compressors.

NEW DIVISION—An Electromechanical Division has been formed by ATLANTIC RESEARCH CORP., Alexandria, Va. The new division, headed by James W. Fitzgerald, will undertake studies in ultrasonics, sonar vibration and explosion phenomena, as well as the manufacture of various related instruments and gages.

LARGER QUARTERS — MIDWEST CHROME PROCESS CO., Detroit, has moved to new quarters at 2771 Hammond, providing 10,000 sq ft of floor space. New equipment for finishing small plated parts enables the firm to turn out 2 million small chrome plated pieces daily.

marginal producers, have been pressed into service to bridge the gap between by-product capacity and requirements. U. S. Steel Corp. alone is now operating about 3000 beehives. At the close of 1949, some 13,662 beehive ovens with a rated capacity of 8,672,200 tons were in existence.

Meanwhile, steel producers have been taking steps to provide more coal for more coke. U. S. Steel will have a new 4000-ton-a-day coal mine operating in Washington County, Pa., early in 1952. It is also reopening next summer the Collier mine near Uniontown, Pa., closed since 1928, to provide a similar tonnage for nearby beehive ovens.

Contracts for Ovens

New oven capacity for which contracts have been let this year include Donner-Hanna Coke Co., 36; Alabama By-products, 29; Inland Steel Co., 65; Weirton Steel Co., 61; Republic Steel Corp., 126; Sloss-Sheffield Steel & Iron Co., 30. Rebuilding and repair contracts have been let by Geneva Steel Co., rebuilding of one battery; Youngstown Sheet & Tube Co., repair of 70 ovens; Colorado Fuel & Iron Co., repair of one battery; Inland Steel Co., repair of two batteries; Jones & Laughlin Steel Corp., rebuilding of one battery; Carnegie-Illinois Steel Corp., Clairton, Pa., rebuilding 174 ovens, and Gary, Ind., rebuilding one battery; Bethlehem Steel Corp., rebuilding one battery at Johnstown, Pa., and rebuilding three batteries at Sparrows Point, and Republic Steel Corp., rebuilding one battery.

Pittsburgh Industry Shows Gain

Pittsburgh—Business here rose last week to 201.1 pct of the 1935-39 average, a gain of 5.3 pct from the previous week, according to the Bureau of Business Research of the University of Pittsburgh. Bituminous coal production was up, and electric power output was at a record high, 272 pct. The gain in rail shipments more than offset a drop in river tonnage.

Steel Heads See More Growth, Higher Prices

Fairless says union demands will be met if they conform to fifth wage round pattern . . . Hook asks meeting of Washington and steel . . . Both predict steel will meet needs of nation.

Los Angeles — Ben Fairless, president of U. S. Steel, said if union wage demands conform to the fifth-round pattern, satisfactory settlement will be reached—but a steel price rise will be imperative to meet not only higher costs of wages but higher costs of materials. Mr. Fairless also discussed steel shortage problems of the oil industry at the American Petroleum Institute at the Biltmore Theatre here last Thursday.

Warns Against Strikes

Higher costs of just ten materials have added $4 a ton to total steel shipments and a 15¢ an hr wage boost would pin on another $6 per ton, he said. To insure the industry's ability to expand in the future by establishing a fair price and fair profits, the average price of steel, now under 5¢ a lb, would have to be raised about ½¢ (slightly less than $10 a ton), Mr. Fairless added.

Contrary to howls that a moderate price rise in steel spells inflation, he continued, a 10 pct rise would only add less than 1 pct to the cost of products made mainly of steel. The industry can fill all essential steel needs if production is not interrupted by strikes and if nothing blocks expansion, he said, stressing that there must not be a strike.

He dismissed far-reaching Washington estimates on future steel needs as "guesswork" and said steel will continue expansion past the 110 million ton goal of 1952 "until it can produce every pound of steel it is capable of selling".

The U. S. Steel head told the petroleum industry to re-examine their steel needs estimates for 1951 and to employ the lesser amount of steel that will be available to them to best advantage.

New York — Ever-expanding steel capacity accompanied by a higher steel price level were forecast by Charles R. Hook, chairman Armco Steel Corp., in challenging speech before the New York State Chamber of Commerce last week.

As a means of solving present and future steel expansion problems Mr. Hook proposed a meeting of government and steel industry spokesmen. He cited the recent meeting between Commerce Secretary Sawyer and steel leaders which was followed within a few days by pledges of nearly 10 million tons expansion within the next 25 months. Pointing to this as an example of what can be done, he urged government and industry leaders "to sit around the table for several days in an off-the-record discussion . . . of our needs for steel."

Steel Growth Tops Auto

If the country needs still more steel after another 10 million tons capacity have been added it will be forthcoming, he declared, pointing out that there is no fixed ceiling on capacity. "The steel industry cannot remain static."

In its first 50 years the steel industry increased production by 4000 times, but by comparison the fabulous auto industry increased by only 2000 times during its first 50 years, he pointed out.

Problems of raw materials, manpower and transportation would have to be overcome in order to undertake immediate expansion vastly beyond present plans. "No one can possibly know what heights our steelmaking may reach by, say 1975. It may well be as much as 150 million tons of annual capacity."

Mr. Hook declared that a higher steel price level "is being forced upon us" by higher costs of expansion and raw materials and by higher wages being demanded right now.

STEEL'S EXPANSION RECORD

Year	Ingot Capacity	Capacity Increase
1899	20,000,000	
1909	38,080,000	18,080,000
1919	61,020,000	22,940,000
1929	71,438,000	10,417,000
1939	81,828,000	10,390,000
1950— July 1	100,563,000	18,734,000
1952— Dec. 31	109,963,000	9,400,000
1975	150,000,000(?)	40,037,000(?)

New J & L Expansion Seen

Cleveland—Jones & Laughlin Steel Corp. will build a new blast furnace and coke plant as part of a major expansion of Cleveland steelmaking facilities to be announced shortly. It is also believed that J & L will build an electric furnace shop and increase finishing capacity.

Part of the production of the new J & L capacity may go to its plate works at Aliquippa, where a major expansion program is underway.

Luntz Buys Abandoned Plant

Cleveland—Luntz Iron & Steel Co. has purchased American Sintering Co.'s long-abandoned plant at Hubbard, Ohio, and will convert the 5-acre property into a dismantling yard for old railroad cars and locomotives and a scrap yard.

Arrange for Ore Co. Financing

New York—Financing arrangements for the Iron Ore Co. of Canada's $200 million development program of Labrador-Quebec ore fields have been completed, announced George M. Humphrey, ore company head and president of M. A. Hanna Co.

Heading a joint underwriting group, Harriman, Ripley & Co., Inc., and Kuhn, Loeb & Co., will place the initial issue of $100 million in first and collateral mort-

gage 3¾ pct bonds, series A, due in 1977. They will be taken by 15 American and four Canadian insurance firms.

Capital structure of the Iron Ore Co. will include $125 million of first mortgage bonds; $40 million of income debentures; and $60 million of common stock. Twenty-five million dollars of the bonds will be left unissued. Junior securities will be taken up by stockholders of the ore company.

Empire to Up Ingot Rate 20 Pct

Mansfield, Ohio—A $10 million expansion program designed to increase ingot capacity by 20 pct has been announced by Empire Steel Corp.'s president Don W. Frease.

Rolling capacity will be increased from the present 21,000 tons per month to a potential of 45,000 tons. The present plant rolls 18 to 30 gage sheet. The new facilities will handle 10 to 16 gage hot-rolled sheet strip.

Steelmaking Lags, Says Chapman

Los Angeles—Rearmament and the civilian economy are threatened by insufficient steel capacity and because scarcities in some steel products are becoming alarming, the government may regulate steel in the oil industry, said Oscar L. Chapman, Secretary of the Interior, at the American Petroleum Institute here.

He said it was "time that steelmakers faced economic realities and raised their sights".

Ohio Coal Mine Shuts Down

Birmingham—One of the Black Diamond Coal Co.'s three mines has been closed and the operation of another was slowed 50 pct because of the high cost of production and absence of demand.

Carnegie Furnace in Blast

Pittsburgh—Carrie No. 4 blast furnace of the Carnegie-Illinois Steel Corp. was blown in Nov. 12. It was down for relining since June.

Republic Plans 672,000-Ton Steelmaking Rise

Will cost over $75 million . . . Is biggest expansion yet for Cleveland district . . . Will build new blast furnace, buy up an old one . . . Plans soaking pits, openhearths, improvements.

Cleveland—Plans of Republic Steel Corp. for a 672,000 ingot ton increase in steelmaking capacity, biggest single expansion of steelmaking capacity ever undertaken in the Cleveland District, were revealed here by C. M. White, president of Republic Steel Corp.

This is in addition to 180,000 tons resulting from an expansion of the present openhearth plant now nearing completion, and will represent an investment of more than $75 million.

Incentive to Expansion

Cleveland — Faster 5-year writeoffs of plants working for defense is making possible Republic Steel Corp.'s current expansion program of 672,000 tons. (The Iron Age, Nov. 16, 1950, p. 109.) Work on the project will start at once and the first steel will be poured early in 1952.

Republic has filed an application for a certificate of necessity with Washington, required under the accelerated depreciation law which permits industry to absorb within a shorter time inflated costs of new plants and equipment.

As a part of the program, Republic is acquiring ownership of the No. 5 blast furnace and RFC coke plant here which it has been operating on a sub-lease from Kaiser-Frazer Corp.

Major facilities included in the expansion program are:

A by-product coke plant consisting of 126 coke ovens, together with facilities for coal chemical products:

A 1400-ton blast furnace complete with necessary steam generating and blowing equipment;

Four openhearth furnaces, each able to produce 275 tons of steel per heat, together with buildings, cranes, ladles, etc.;

New soaking pits, replacing and supplementing capacity of the present eight blocks to provide for the necessary reheating of ingots;

Improvements to the present 32-in. blooming mill to facilitate the rolling of slabs;

A new 72-in. tandem cold reducing mill for production of additional cold-rolled sheets.

Major additions will provide more heating, annealing, pickling and other processing relative to production of sheets and strip.

The blast furnace will be built adjacent to the present No. 5 furnace. The furnace will have a 28-ft diameter hearth and will be similar to the present No. 5 furnace, currently one of the world's largest furnaces. Production per day from the furnace will approximate 1400 tons of iron.

Operating Five Furnaces

Republic Steel Corp., in its Cleveland District plant, is currently operating five blast furnaces, 15 openhearth furnaces and five batteries of coke ovens totaling 279 ovens.

The daily capacity of the five blast furnaces is 4615 tons. Addition of the sixth furnace will boost daily capacity to over 6000 tons. Completion of current and contemplated construction will enable each of the 15 openhearth furnaces to produce 220 tons per heat. This, with the use of Liberian ore, is expected to increase rated annual capacity from present steelmaking furnaces to 1,937,000 tons. Annual capacity after completion of the program announced today will be 2,609,000 net tons.

At present Republic operates two blooming mills here, a 44 in.

mill and a 32 in. mill. The 32 in. mill will be converted to facilitate rolling slabs as well as blooms.

To increase output of the 98 in. strip mill, the slab storage yard will be extended 300 ft with an addition to the building. The three slab heating furnaces will be rebuilt and enlarged. A fourth slab heating furnace is now being constructed under a previous program.

To handle the increased steel coming off the hot mill, a new coiler and coil conveyer will be added, supplementing the present two coilers. A 48 in. continuous pickling line will be erected in a new building parallel to the present structure which houses two 98 in. continuous pickling lines. A new coil conveyer will be installed from the picklers to the cold-rolling mills. To cold reduce the additional steel tonnage, a 72 in. four-stand tandem mill will be erected in the roll shop area.

Gaging Method Will Speed Aircraft Output

New system may revolutionize building of aircraft fixtures . . . Permits construction directly from drawings without use of master tools—*By G. F. Elwers.*

Farmingdale, N. Y.—A time and money saving optical system for building large fixtures and jigs has been developed after 3 years' study by Republic Aviation Corp. for the Air Force.

Based on use of a light beam as a reference plane for locating points on a structure, the method permits great accuracy and absolute reproducibility of results without use of master jigs, fixtures or patterns.

The system, modification of a British World War II development, uses a telescope and collimator, or special light source to establish a reference beam of light in space.

Precision Adjustments

Second unit is an optical positioner consisting of a beam-mounted collimator capable of precision adjustment to any position in space. By controls, the positioner beam with its collimator is aligned with the reference light beam. An adaptor plate attached to the positioner beam is used to establish the point being located.

The method can locate a point in a plane perpendicular to the light beam with an accuracy of 0.0015 in. at 50 ft., and assures angular alignment within 6 seconds of arc at the same distance.

Linear distance along the beam light cannot be measured by the optical system, but is established between a button on the telescope and another button on the collimator by a rod with micrometer adjustment.

Besides the speed and accuracy, greatest advantage of the new system is reproducibility of results.

Obviates Master Tools

Previously, the aircraft industry made master tools for large components. From these masters, jigs and fixtures were built. To insure interchangeability of components such as a wing or fuselage section, the master tool was needed for each new jig or fixture.

When construction work was divided among subcontractors, the master tool, in some cases a complete sample wing, had to be used to set up each jig and fixture. This took time, was expensive and risked damage to the master.

Now, without such master tools, jigs and fixtures can be made directly from drawings. This means more speed in aircraft construction, and a bombed or burned-out factory will not lose irreplaceable master tools.

The Republic system, developed at a cost of $175,000, is complemented by standardized system of making fixtures from standard pipe and castings, largely eliminating welded fixtures. Boeing has used the system in tooling for the B-47, and Fairchild Aircraft has also used it.

Under its contract with the Air Force, Republic will study additional uses for the system and demonstrate its use to other government contractors. The system appears of value in checking the accuracy of machine tools, in ship construction, in erection of large machinery, and in setting bearings for line-shafting.

"How's your new baby, Frank?"

Metal to Go Into Deep Freeze

Cambridge, Mass.—Metal will be the first material to go into the deep freeze so that researchers at the Massachusetts Institute of Technology can study its mechanical properties at extremely low temperatures. Information on strength theory which may be used in designing stronger metals for conventional use may be obtained by putting metal in MIT's Cryostat, a 15 cu ft cold box that can cool its contents to 452° below zero Fahrenheit.

Bureau Approves Building Funds

Washington—The Bureau of Reclamation has allocated $855 million for construction projects during the current fiscal year, including both new and held-over funds. Included is the completion of eight new storage dams, five power plants, one pumping plant, and more than 2000 miles of transmission lines.

Mills Clear Decks for Defense Orders

Producers caught with large carryovers . . . Try to clear them up in January . . . Make few commitments in February, March . . . After January DO orders expected to zoom—*By G. Beaudet.*

Chicago—With the Nov. 15 deadline for filing DO orders out of the way, mill officials have a clearer picture of what's in store for their customers for the early part of next year. The 45-day lead time on DO orders has caused producers to switch from a quarterly to a month-to-month basis in handing out quotas. Little if any commitments are being made for February or March as the mills themselves don't know how heavy defense orders will be at that time. However, it is generally accepted that they will increase.

January may be almost a complete loss in some instances. Mills have been caught with fairly large carryovers and are trying to clear them up in that month if possible. One producer in the area is taking no new orders for January on sheets, plates, bars and shapes. Other producers report similar carryovers, ranging from 1 to 2 months on cold and hot-rolled sheets respectively, and from 6 to 8 weeks on plate.

Another in the area reports a 40 pct cutback in bar allotments for January. A producer outside the area is going to cut back 40 pct on hot-rolled bars, plates and shapes, 30 pct on sheets and drop out January altogether on cold-finished bars and pipe to make up the carryover.

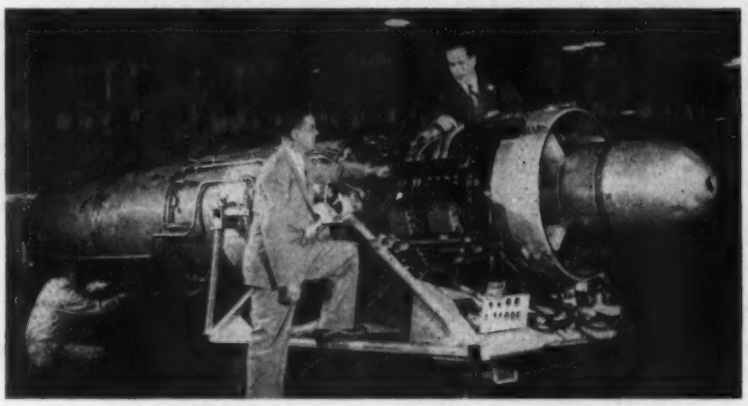
The fact that one mill has a larger carryover than another does not necessarily mean that it has done a poorer job production-wise. Some mills made adjustments during the last quarter that make them look good at the end of the year. Other mills made no adjustment in allotments for vacations and wildcat strikes.

In other, and perhaps most cases, it was just a matter of too much optimism on the production side and overselling on the sales side. Another reason for large carryover tonnages is that some mills undergoing expansion programs have to take steel away from their customers for their own use. While it will benefit their customers in the future, it hurts right now.

See DO Orders Up

After January DO orders are expected to zoom. On top of that there will be more government programs, such as those for freight cars and ore boats. The directive for warehouses amounts to a DO order right now. All this means that there will be less free steel left over.

Some informed mill sources seem to think that the present system of alloting steel to warehouses will not stand up too long. They know that during the coming months the tonnage left over for warehouses will get smaller and smaller. Since the government is interested in protecting the small consumer who buys warehouse steel, it will probably be necessary for the government to issue a directive ordering a fixed tonnage to be set aside for warehouses.



GE Turbojet Uses Less Strategic Metal

Lynn, Mass.—With shortages of alloy steels mounting, General Electric's Aircraft Gas Turbine Divs., here, drew the blinds on the nation's first aircraft jet engine to be built with major reductions in strategic materials. It is the J-47-GE-17, the most powerful turbojet announced by GE, equipped with an afterburner for added thrust.

The jet engine will power the new Air Force fighter, North American's F-86D. An all-weather engine fitted with electronic controls for fuels and jet nozzle, the "17" uses substitute metals readily available in crisis. The less strategic metals have been used without "any anticipated sacrifice in engine life or performance".

Added to a dry static thrust rating of 5200 lb is thrust resulting from burning additional fuel in the stovepipe-like afterburner. With this system, standard hydraulic engine controls were not enough. GE engineers devised electronic controls which through brain boxes automatically regulate fuel flows. Hot air from the engine is channeled to hollow parts to melt ice crystals which clog up passage of air at the jet's nose.

Last week GE dedicated its new $4 million laboratory. The vital jet engine compressors will be put through their paces under conditions of 70,000-ft altitude and cold 100° below zero Fahrenheit. The lab was dedicated to the late Dr. Sanford Moss, gas turbine pioneer.

PROMINENT IN FIELD: At the Harbor Island dedication were, left to right: T. H. Wickenden, vice president, Inco; F. L. LaQue, in charge of Corrosion Engineering Section, Inco; Admiral C. D. Wheelock, Deputy Chief, Bureau of Ships, USN; Capt. S. Teller, U. S. Research & Development Board; and R. S. McClelland, Mayor of Wilmington, N. C. (Photo by Wilmington Star News.)

Industry Girds for Stronger Corrosion Fight

Inco expands Kure Beach corrosion testing project . . . Opening well-attended by industry, military, government . . . Over 35,000 specimens exposed to date—*By Bill Czygan.*

Wilmington, N. C.—Industry is taking a stronger stand for a major offensive against a common enemy—corrosion. This cooperative effort to reduce the annual toll, running into hundreds of millions of dollars, is largely inspired by further expansion of the Kure Beach corrosion testing project. The program, established over 15 years ago by International Nickel Co., Inc., to test metals and alloys under marine conditions, has been extended to include both metallic and organic protective coatings, anti-fouling formulations, and the effects of marine growth on metals and wood.

The new laboratories and exposure racks, located near here at Harbor Island, were formally opened last week, with more than 100 representatives of industry, military services, and government attending. The interchange of ideas, even among competitors, pointed up the project's purpose: study of materials under marine conditions and distribution of data to all of industry.

To date, over 20,000 specimens of all types of materials have been exposed in the atmospheric test racks; 40 such racks, each supporting 700 to 900 specimens, are arranged on a 1-acre plot about 800 ft from the seashore. Severe conditions are experienced on another site about 80 ft from the shore, where the combined effects of sea water spray and sea air are studied. Specimens are attached to the racks by means of porcelain insulators to avoid galvanic action and for greater testing accuracy. Atmospheric tests, still located at the Kure Beach station, are believed the largest in the world.

Now over 2500 specimens are exposed to sea water, and the number tested in this manner during the past 15 years exceeds 15,000. The sea water experiments were originally carried on at the Ethyl-Dow Chemical Co. bromine plant at Kure Beach. The new site provides a continuous supply of uncontaminated sea water with a broad range of temperature, varying from 45° to 85° F.

Tests for anti-fouling characteristics of metals, alloys, paints and other protective coatings are carried on at the new Inco Marine Laboratory under the direction of Dr. W. F. Clapp, authority on marine organisms. As many as 2000 specimens are exposed, with exposures varying from 6 months to several years.

Erosive and Corrosive

Erosive, as well as corrosive, conditions are studied, especially with regard to such uses as condenser tubes, piping systems, pump impellers, propellers and other underwater parts of ships. Specimens tested in high velocity jets of sea water mixed with air bubbles have aided in the development of condenser tube alloys resistant to impingement attack.

Critical velocities at which protective films lose their adherence are determined by whirling bar or tube specimens through violently agitated sea water at velocities up to 30 fps. A total of 600 ft of trough holds several hundred test samples for studying effects of milder velocities.

France Buys First C-R "Y" Mill

Pittsburgh—A 20-in. "Y" Type reversing cold strip mill sold by Mackintosh-Hemphill Co., Pittsburgh, to S. A. Etirage et Laminage du Nord for installation in Jeumont (Nord), France, will be the first of its kind to operate in that country.

The mill will cold-roll and coil up to 16-in. widths of low carbon, high carbon, and alloy steels. It will work on .125-in. thick hot-rolled strip and reduce it to .010 in. or less.

Plan Electroplating Expansion

Warren, Ohio—Thomas Steel Co. approved $500,000 for expansion and improvement of electroplating capacity for specialty products and other equipment.

Thomas recently expanded the range of its products and its capacity with the installation of a new high-speed tandem cold-reduction mill. The new mill's average annual capacity is 120,000 tons.

Fastener Industry Tops Shipment Record

Output in 1951 could climb higher . . . Check will come from steel shortage . . . Boom stems from general economic health . . . Things were slower a year ago—*By Bill Lloyd.*

Cleveland—Shipments of nuts, bolts, rivets and screws will reach 1 million tons this year, highest in the history of the industrial fasteners industry.

But this is only the beginning. The industry's outlook for 1951 is limited only by the supply of steel. Shipments of headed and threaded products, according to preliminary estimates, could top 1,250,000 tons next year, if steel were available.

Source of this tremendous boom in the domestic nut, bolt, rivet and screw industry stems from general economic improvement. "We would have had a big year, possibly a record-breaking year, with or without Korea," one company official said.

A year ago the industry was recovering slowly from a mass reduction of inventory by its customers.

Now all major facets of the fastener markets are active, including distribution channels, jobbers, etc., which are a source of supply for small business and the retail trade, or about 25 pct of the market, the automotive industry, which is another 25 pct, as well as farm implements, railroads and home appliances.

Present backlogs are 3 months. They have doubled since June. Backlogs are based on current rate of shipments.

Best previous year for the industry was 1943, when shipments of finished products totaled about 942,700 tons. Last year, shipments were 863,000 tons.

Stocks Are Shrinking

The 1 million tons the industry will ship this year and the 1,250,000 tons predicted for next year are no frustrated salesman's dream. Third quarter shipments this year registered a 46 pct increase over the third quarter of 1949.

Also, in August 1949, the industry had a 90-day stock of raw and finished inventory. Last August

STEEL PRODUCTION (Ingots and Steel for Castings)

As Reported to the American Iron & Steel Institute

Period	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL		Calculated Weekly Production (Net Tons)	Number of Weeks in Month
	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity	Net Tons	Percent of Capacity		
January, 1950	7,131,519	96.5	379,252	80.6	419,601	71.9	7,930,372	93.9	1,790,152	4.43
February	6,142,178	92.0	255,565	60.2	395,502	75.0	6,793,245	89.1	1,698,311	4.00
March	6,747,680	91.3	285,726	56.5	473,630	81.1	7,487,036	88.7	1,690,076	4.43
1st Quarter	20,021,377	93.3	900,543	65.9	1,288,733	76.0	22,210,653	90.6	1,727,111	12.86
April	7,314,733	102.2	407,909	89.5	490,030	86.7	8,212,672	100.4	1,914,376	4.29
May	7,597,837	102.6	437,006	92.9	517,044	88.6	8,551,887	101.3	1,930,449	4.43
June	7,218,570	100.9	406,944	89.3	506,001	89.5	8,131,515	99.4	1,895,458	4.29
2nd Quarter	22,131,140	102.0	1,251,859	90.6	1,513,075	88.2	24,896,074	100.4	1,913,611	13.01
1st 6 months	42,152,517	97.7	2,152,402	78.3	2,801,808	82.2	47,106,727	95.5	1,820,902	25.87
July	7,220,214	96.9	380,317	79.6	470,763	78.4	8,071,294	94.7	1,826,085	4.42
August	7,315,215	98.0	405,116	84.6	509,984	84.7	8,230,317	96.3	1,857,859	4.43
*September	7,258,981	100.7	409,216	88.7	525,017	90.3	8,193,194	99.3	1,914,298	4.28
*3rd Quarter	21,794,390	98.5	1,194,651	84.4	1,505,764	84.4	24,494,805	96.7	1,865,560	13.13
*9 months	63,946,907	98.0	3,347,053	80.4	4,307,572	82.9	71,601,532	95.9	1,835,937	39.00
†October	7,720,762	103.4	436,765	91.5	561,451	93.3	8,718,978	102.0	1,968,167	4.43
November	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.29
December	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.42
4th Quarter	.....	.....	.....	.....	.....	.....	.....	.....	.....	13.14
2nd 6 months	.....	.....	.....	.....	.....	.....	.....	.....	.....	26.27
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....	52.14

Note—The percentages of capacity operated in the first 6 months are calculated on weekly capacities of 1,868,287 net tons open hearth, 106,195 net tons Bessemer and 131,786 net tons electric ingots and steel for castings, total, 1,906,268 net tons; based on annual capacities as of January 1, 1950, as follows: Open hearth 86,984,490 net tons, Bessemer 5,537,000 net tons, Electric 6,871,310 net tons, total 99,392,800 net tons. Beginning July 1, 1950, the percentages of capacity operated are calculated on weekly capacities of 1,685,059 net tons open hearth, 107,806 net tons Bessemer and 138,856 net tons electric ingots and steel for castings, total 1,928,721 net tons; based on annual capacities as of July 1, 1950, as follows: Open hearth 87,858,990 net tons, Bessemer 5,621,000 net tons, Electric 7,083,510 net tons, total 100, 563,500 net tons.

* Revised.

† Preliminary figures, subject to revision.

January, 1949	7,209,865	101.2	406,552	92.6	498,973	98.1	8,197,390	100.4	1,850,427	4.43
February	6,635,765	102.0	379,698	95.3	478,479	102.0	7,493,942	101.6	1,873,485	4.00
March	7,476,139	103.7	430,176	97.5	495,481	95.4	8,401,796	102.9	1,896,568	4.43
1st Quarter	21,401,769	102.3	1,216,426	95.2	1,472,933	97.7	24,093,128	101.6	1,873,494	12.86
April	7,017,712	100.6	404,095	94.6	374,358	74.4	7,796,165	98.6	1,817,268	4.29
May	6,891,293	95.6	400,741	90.9	306,956	59.1	7,598,990	93.0	1,715,348	4.43
June	5,956,402	85.4	349,196	81.8	199,058	39.6	6,504,656	82.2	1,576,237	4.29
2nd Quarter	19,865,407	93.9	1,154,032	89.1	880,372	57.7	21,899,811	91.3	1,683,306	13.01
1st 6 months	41,267,176	98.1	2,372,458	92.1	2,353,305	77.6	45,992,939	96.4	1,777,848	25.87
July	5,309,060	73.8	300,236	68.2	175,535	33.9	5,784,831	71.0	1,308,785	4.42
August	6,103,326	84.7	355,335	80.6	264,110	50.9	6,722,771	82.3	1,517,556	4.43
September	5,994,100	86.1	350,282	82.2	253,553	50.5	6,597,935	83.6	1,541,574	4.28
3rd Quarter	17,406,486	81.5	1,005,853	76.9	693,198	45.0	19,105,537	78.9	1,455,106	13.13
9 months	58,673,662	92.5	3,378,311	87.0	3,046,503	66.6	65,098,476	90.5	1,669,192	39.00
October	814,618	11.3	.....	.....	113,729	21.9	928,347	11.4	209,559	4.43
November	3,806,870	54.6	172,270	40.3	243,989	48.5	4,223,129	53.4	984,412	4.29
December	6,953,653	96.7	396,075	90.0	378,496	73.0	7,728,224	94.8	1,748,467	4.42
4th Quarter	11,575,141	54.2	568,345	43.4	736,214	47.8	12,879,700	53.2	980,190	13.14
2nd 6 months	28,981,627	67.8	1,574,198	60.2	1,429,412	46.4	31,985,237	66.0	1,217,558	26.27
Total	70,248,803	82.8	3,946,656	76.0	3,782,717	61.9	77,978,176	81.1	1,495,554	52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,626,717 net tons open hearth, 99,589 net tons Bessemer and 117,240 net tons electric ingots and steel for castings, total 1,843,516 net tons; based on annual capacities as of January 1, 1949 as follows: Open hearth 84,617,040 net tons, Bessemer 5,191,000 net tons, Electric 6,112,690 net tons, total 96,120,930 net tons.

the industry had less than 2 months and presently has less than 50 days. The industry should have 60 days, but the shortage of steel, wire and wire rods, cold heading quality, keeps inventories down.

Employment is rising. Companies are hiring men. The industry employs about 40,000 production workers, and thus far its manpower situation has been tight but not critical.

Plenty of Capacity

There is plenty of capacity for any foreseeable emergency. Plants and equipment are in good shape and while little building has taken place since the end of the war, there has been a big improvement in layout and machinery.

Right now, the big problem is steel. The industry feels it needs more than 2 pct of finished steel, which it could have had but didn't need in 1949, when companies were shipping out of inventory.

The producers of headed and threaded products are confident they can cut up 2½ pct of all finished steel. With the exception of 1949, when the industry received 1.6 pct of finished steel, AISI figures show that the industry received from 2 to 2.3 pct of finished steel every year since 1940.

Feeling Steel Pinch

Output of nonferrous and alloy tonnage is steadily increasing. This part of the business is small in tons but big in headaches and dollars. Last year the industry consumed 38,900 tons of alloy steel and 2300 tons of stainless.

But the big pinch now is being felt by those producers handling the bolt, nut and rivet requirements of the freight car builders. They are not getting priority for raw material to cover their shipments to the car industry.

As a result, nearly every company in the industry reports a lack of steel, particularly rods. Some companies have resorted to foreign tonnage, from France and Germany. Complaints of a decrease in steel shipments are common.

Alcan Reveals Aluminum Deal Terms Criticized by Washington

Toronto—Terms of Aluminum Co. of Canada's offer of 200,000 tons of primary aluminum for the U. S. stockpile at 16½¢ a lb with a 1¢ a lb maximum freight allowance were revealed last week by Alcan. After letting the offer expire on Oct. 31, government officials criticized it for late delivery of aluminum needed now.

They said that only 20,000 tons could be delivered at once, with the bulk coming in 1953 and 1954. Alcan said its original offer promised 35,000 metric tons in 1951; 65,000 tons in '52; and the balance in 1953. Revisions in price in line with Alcan's production costs were part of the deal.

The firm said that the original expiration date was Oct. 12 and when Washington asked for the Oct. 31 extension, it was impossible to maintain the original delivery schedule which was then stretched out into 1954.

NPA Earmarks Steel Tonnage For Additions to Lakes Ore Fleet

Washington—Allocation of 10,000 tons of steel monthly for construction of 12 Great Lakes ore carriers and other cargo vessels has been ordered by the National Production Authority. The order covers the first quarter of 1951. Allocations for the second quarter will be considered later.

Addition of the ships to the Lakes fleet will up the ore haul by 7 million tons annually, and eliminates a possible bottleneck in the expected 9½ million ton expansion in steel output planned by the end of 1952.

Nine of the ships will haul ore and one will carry limestone. Two freight car ferries will replace existing condemned ferries.

The NPA also announced broadening of the ban on amusement construction to include golf courses, swimming pools, yacht basins, tennis courts and race tracks if expenditures over $5000 in any 12 month period are involved.

STEEL CONSTRUCTION NEWS

Fabricated steel awards this week included the following:

7500 **Tons,** Newark, N. J., Contract 45B, bridge superstructure for New Jersey Turnpike Commission, to be divided between American Bridge Co., Pittsburgh, and Bethlehem Steel Co., Bethlehem, Pa.

1100 **Tons,** Chesterfield, Va., extension to power station for Virginia Electric Co. through Stone and Webster Engineering Corporation, Inc., to Bristol Steel and Iron Works, Bristol, Va.

885 **Tons,** Winwood, Pa., Winwood Apartments, to Bethlehem Steel Co., Bethlehem, Pa.

800 **Tons,** West Springfield, Mass., extension to power station of Western Mass. Electric Co. through Stone and Webster Engineering Corporation, to Haarmann Steel Co., Holyoke, Mass.

600 **Tons,** Belasco, Texas, power plant extension for Dow Cherical Co. through Stone and Webster Engineering Corporation, to Mosher Steel Co., Houston, Texas.

500 **Tons,** Philadelphia, plate work on propane tanks for Philadelphia Gas Works Co., to Downingtown Iron Works, Downingtown, Pa.

430 **Tons,** Wilmington, Del., Park Tower Apartments, to Bethlehem Steel Co., Bethlehem, Pa.

350 **Tons,** Camden, N. J., highway bridge for New Jersey State Highway Dept., to American Bridge Co., Pittsburgh.

Fabricated steel inquiries this week included the following:

4730 **Tons,** Boston, Mass., new East Boston Expressway. Charles A. Fritz, Beverly, district engineer.

700 **Tons,** Reading, Pa., building for Parish Pressed Steel Co., bids due.

500 **Tons,** Elizabeth, N. J., Contract 66 for New Jersey Turnpike Commission, bids due Dec. 5.

133 **Tons,** Putnam, Conn., clear span composite steel girder bridge and bituminous concrete approaches on Providence St. H. S. Ives, Norwich, Conn., district engineer.

Reinforcing bar inquiries this week included the following:

699 **Tons,** Boston, Mass., elevated structure and new highways, starting from Porter and London Sts. to McLellan Highway, East Boston (new East Boston Expressway). Charles A Fritz, Beverly, district engineer.

660 **Tons,** Chicago, Harris Trust Co. bank vault.

660 **Tons,** Eastlake, Ohio, Cleveland Electric Illuminating Co.

650 **Tons,** Milwaukee, athletic stadium.

550 **Tons,** Newport, Ky., laboratory and research bldg., Atomic Energy Commission.

535 **Tons,** Chicago, Hall Printing Co.

350 **Tons,** Pittsburgh, stores and office bldg., Equitable Life Assurance Society.

310 **Tons,** St. Paul, F. D. Roosevelt homes.

220 **Tons,** Chicago, John M. Smyth Co.

160 **Tons,** McKeesport, Pa., hospital.

120 **Tons,** East Chicago, Ind., Linde Air Products Co.

100 **Tons,** Joliet, Ill., Hart, Schaffner and Marx store.

(Turn to page 90)

• News of Industry •

Reinforcing bar awards this week included the following:

1500 Tons, Melrose Park, Ill., United Sawyer Biscuit Co., to Concrete Steel Co.
980 Tons, Minneapolis, Downtown Auto Park, Inc., to Bethlehem Steel Corp.
900 Tons, Beaver County, Pa., Project LR 77, to Jones and Laughlin Steel Corp.
750 Tons, Indianapolis, apt. bldg., to Polak Steel Co., Cincinnati.
700 Tons, La Porte, Ind., plant addition Allis Chalmers Mfg. Co., to Bethlehem Steel Corp.
500 Tons, Chicago apt. bldg., Lake Shore Drive, to Joseph T. Ryerson and Son, Chicago.
365 Tons, Jeffersonville, Ind., building for Colgate Palmolive Peet Co., to Laclede Steel Co., St. Louis.
300 Tons, Blue Island, Ill., Calumet Intercepting Sewer, to U. S. Steel Supply Corp.
180 Tons, Hudson, Wis., bridge to U. S. Steel Supply Co.
175 Tons, Allegheny County, Pa., Project LR 765, to Electric Welding Co. Pittsburgh.
170 Tons, Faribault, Minn., dormitory, to Husted Co.

Issue Clearer Amendment To Recreational Construction Order

Washington—A second amendment has been made to clarify the hastily issued construction order M-4 which prohibited building for recreational or entertainment purposes. Major changes permit replacement of facilities destroyed by disaster after July 29 and exempts cooperative or multi-tenant construction so long as each participant expends no more than $5000.

Savings of materials under the order are problematical, perhaps non-existent. This type of construction during 1950 had been accounting for about 1 pct of total contract work or about $250 million. Industry officials say that the savings of materials from the ban will be more than offset by a predicted upturn in rural building which is now forecast at about $2 billion in 1951—about 65 pct of which will go for new structures rather than repairs and improvements.

Seeks Reasons for U.S. Output

London—Another search into the secrets of American productivity was made by a British team which toured the U. S. pressed metal industry. Two fundamental reasons for higher American productivity is the will of the worker to produce with higher pay as incentive and the utilization of labor and machines to best advantage, the team concluded.

Dates to Remember

Nov. 26-Dec. 1—American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York. Society headquarters are at 29 W. 39th St., New York.

Nov. 27-Dec. 2—American Society of Mechanical Engineers, national power show, Grand Central Palace, New York. Society headquarters are at 29 W. 39th St., New York.

Dec. 3-5—Hydraulic Institute, annual meeting, Seaview Country Club, Absecon, N. J. Institute headquarters are at 122 E. 42nd St., New York.

Dec. 3-6—American Institute of Chemical Engineers, annual meeting, Neil House, Columbus, Ohio. Institute headquarters are at 120 E. 41st St., New York.

Dec. 5—Spring Manufacturers Assn., annual meeting, Hotel Biltmore, New York. Association headquarters are at 249 Main St., Bristol, Conn.

Dec. 7—Material Handling Institute, annual meeting, Hotel New Yorker, New York. Institute headquarters are at 1108 Clark Bldg., Pittsburgh.

Dec. 7-9—American Institute of Mining & Metallurgical Engineers, Electric Furnace Steel Committee, annual conference, Hotel William Penn, Pittsburgh. Institute headquarters are at 29 W. 39th St., New York.

Dec. 12-14—Diesel Engine Manufacturers Assn., annual meeting, Union League Club, Chicago. Association headquarters are at 1 N. LaSalle St., Chicago.

Dec. 13-14—Power Crane & Shovel Assn., annual meeting, Edgewater Beach Hotel, Chicago. Association headquarters are at 74 Trinity Place, New York.

Plan New York Power Show

New York—New ideas in the design and construction of power plants and in power application to manufacturing will be featured in displays of the 19th National Exposition of Power and Mechanical Engineering. The show will be held coincidentally with the annual gathering of the American Society of Mechanical Engineers at the Grand Central Palace here from Nov. 27 to Dec. 2.

Displays will stress improved fuel economy and more efficient utilization of heat. A featured exhibit will be a scale model of the Hamilton Moses Steam Electric Station of the Arkansas Power & Light Co.

NEW PRODUCTION IDEAS

Continued from Page 36

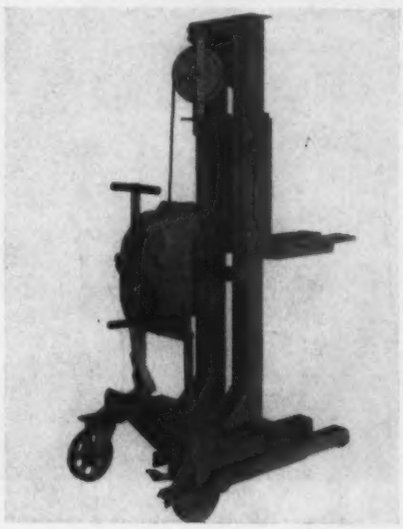
cessive supply hopper spillage or heavy dust conditions and makes the feeder suitable for Class 2, Group installations. Feed rate which ranges up to hundreds of tons per hour of bulk—dry or damp, hot or cold, fine or coarse materials—is not affected by the sealed protection. *Syntron Co.*

For more data insert No. 23 on postcard, p. 33.

Portable Pallet Elevator

Designed for double and triple-decking single-faced pallet loads.

Operation of a fork type portable pallet elevator requires a minimum of time and physical effort. The operator guides the forks under



the pallet, cranks the load up to the desired height, runs the elevator to the load resting on the floor, and opens the brake to lower the pallet load onto the load below it. Hand or electric operation is available. Capacities are 2000, 3000, 4000 and 5000 lb. *Barret-Cravens Co.*

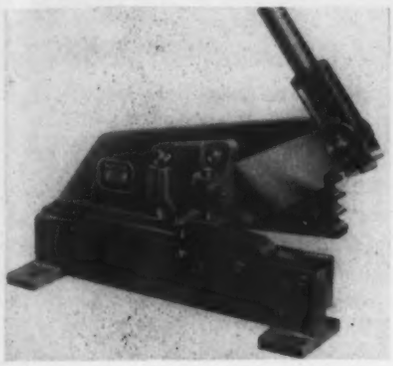
For more data insert No. 24 on postcard, p. 33.

Slitting Shears

Offset frame permits cutting sheet or plate of any length or width.

Hand lever shears have an unbreakable steel plate frame. The range of shears includes five mod-

els, the smallest with capacity of ⅛ in. mild steel plate and the largest, 5/16 in. mild steel plate. Shears up to 3/16 in. capacity are operated by toggle action. Those with ¼ and 5/16 in. capacity have



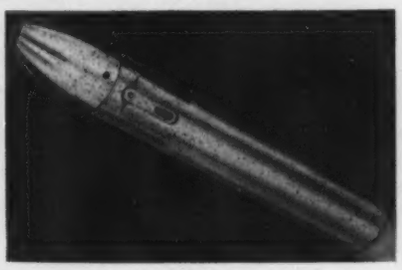
a geared action; the lever handle is equipped with gear teeth which engage a rack cut into the machine. The shears are operated by a single stroke of the lever, and have holddowns adjustable for the thickness of the material being cut. Machines will cut rounds, flats as well as sheet steel. *Julius Blum & Co. Inc.*

For more data insert No. 25 on postcard, p. 33.

Air Gage Plug

For checking rough-surfaced bores.

A new contact gaging plug for Pratt & Whitney Air-O-Limit internal comparators is claimed to permit air gaging of rough-surfaced bores with a high degree of accuracy. The rate of air flowing



through the gaging plug is controlled by carbide buttons mounted on spring leaves. The buttons are depressed by contact with the work during gaging, and impede the escape of air from small nozzles within the plug. The resultant change in line pressure causes the Air-O-Limit indicator to show the variation from basic diameter in decimal terms. The contact plug is especially suited for diamond boring and reaming operations where

finishes exceed 50 microinches. *Pratt & Whitney, Div. Niles-Bement-Pond Co.*

For more data insert No. 26 on postcard, p. 33.

5-in-1 Socket Wrenches

Five socket-head wrenches fold knife-like into single handle.

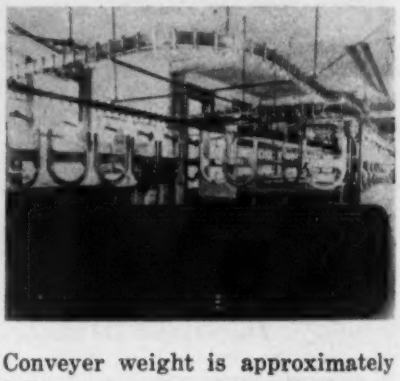
A single tool that fits the popular size socket screws and bolts is small enough to fit into a pocket, yet permits great leverage. Wrenches are tempered steel to assure longer life and can be ground down. *H. D. Hunter Co.*

For more data insert No. 27 on postcard, p. 33.

Monorail Conveyer

Flexible, versatile, lightweight; buy it by the foot.

For conveying light parts, a lightweight monorail type conveyer can be operated as a bench, overhead, or portable conveyer system.



Conveyer weight is approximately 3 lb per ft and and installation requires no superstructure. It is a packaged conveyer in 2, 4, 6, 8, and 10 ft sections with L's, 45's, etc. It is simple to set up and can be rearranged as plant needs change. *Lightweight Conveyor Co.*

For more data insert No. 28 on postcard, p. 33.

Coated Canvas Gloves

Neoprene coated for heavy duty.

Black heavy-duty Stanzoil industrial gloves are made with a nonslip grip, said to hold wet things as if dry. Inserted thumb design moves seam out of the wear area, and preflex palm design helps prevent wear from bunching. Fingers are curved to provide hand comfort and efficiency. *Pioneer Rubber Co.*

For more data insert No. 29 on postcard, p. 33.

Resume Your Reading on Page 37

Briefs and Bulletins

ferroalloy adjustments — Pittsburgh Metallurgical Co., Niagara Falls, N. Y., has changed the following ferroalloy prices: Ferrosilicon, 15.51 to 16 pct, $91 per gross ton; 25 pct, 20¢; 50 pct, 12¢; 65 pct low impurity, 15¢; 75 pct, 14.3¢; 80 to 90 pct, 15.55¢; 90 to 95 pct, 17.5¢. High carbon ferrochrome, 21.75¢ per lb of contained Cr; low carbon ferrochrome silicon, 21.75¢ per lb of contained Cr and 12¢ per lb of contained Si. Prices are f.o.b. on carload lots and are in cents per lb of contained Si except as otherwise noted.

second look — Warehouses don't feel that NPA Order M-6 (steel for warehouses) gives them a fair shake. They foresee an ever-decreasing tonnage for them as the priority programs pick up steam. They also believe that the early elation of small business will soon turn to screams which are sure to be heard in Washington.

stockpiling shortage—Inland Steel Co.'s production of galvanized sheets has been cut back. Inland's reason was the zinc shortage, "aggravated by government stockpiling." Hjalmar W. Johnson, in charge of steel production, said the cuts vary but reach as high as 50 pct of capacity operations.

urgent business?—Some steel people who regarded speedy fulfillment of DO orders as an urgent matter have been given cause to wonder. Recently an alloy producer completed an order for stainless steel plate for the atomic energy program. When he asked for shipping instructions, the producer was advised to ship the steel to a warehouse.

strangling—Decreased auto output for the rest of this year will be followed by substantial cutbacks in the first quarter of next year. Cutbacks will be made in spite of industry efforts to keep schedules high. They will be caused by material shortages, model changes and supplier strikes.

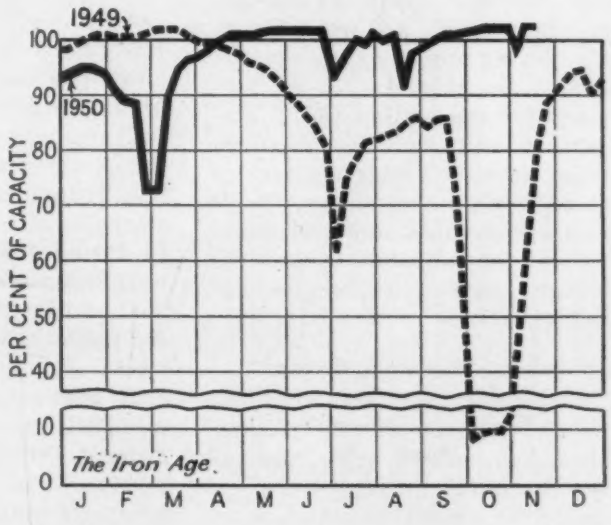
cold-rolled strip — Detroit Steel Corp.'s price for cold-rolled strip at New Haven, previously quoted here at $5.85, should have been quoted at $5.35, for steel of carbon range of 0.25 pct to 0.40 pct.

strange fruit —Some steel consumers wise in the conversion game are predicting easier steel procurement. Their explanation is that with aluminum, copper and nickel choked off purchasing agents aren't willing to gamble as they once were on high priced steel. Other evidence indicates there are plenty of takers for their conversion deals.

tinplate prices—This week Carnegie-Illinois Steel Corp. announced new tinplate prices for next year. They average 12 pct higher than this year's prices, reflecting increased costs including tin. New prices per base box 100 lb basis weight f.o.b. producing point are common coke tinplate (1.25 lb pot yield) $8.45; electrolytic tinplate (0.25 lb coating) $7.15; blackplate $6.25; special coated mfg. ternes $7.50.

beryllium alloys—Changes in prices have been announced by Beryllium Corp., effective Nov. 15. Beryllium-copper in 5 lb ingots is $1.56 per lb of alloy. Beryllium-magnesium-aluminum is $55 per lb of contained beryllium. Beryllium-aluminum is $69 per lb of contained beryllium.

Steel Operations**



District Operating Rates—Per Cent of Capacity**

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	West	Buffalo	Cleveland	Detroit	Wheeling	Birmingham	South	St. Louis	East	Aggregate
Nov. 12	102.0*	103.5	95.5*	98.0	101.0	104.0	102.0*	104.0*	104.0	106.0	98.5	91.5	112.0	103.0
Nov. 19	101.0	104.5	92.0	98.0	101.5	104.0	100.0	103.0	104.0	106.0	95.5	95.0	126.0	103.0

* Revised.
** Steel operations for the first half of 1950 are based on annual capacity of 99,392,800 net tons. Beginning July 1, 1950, operations are based on new annual capacity of 100,563,500 net tons.

Nonferrous Metals OUTLOOK

Market Activities

NPA issues order covering zinc, zinc dust, zinc oxide and zinc products . . . Secondary ingot boost follows civilian aluminum cutback . . . Alcoa to reactivate idle plants.

New York — National Production Authority's zinc order, effective Nov. 16, states that producers and fabricators need not accept rated orders received less than 30 days before the first day of the month in which shipment is requested. Nor are producers required to ship more than 10 pct of their total scheduled output of zinc, zinc dust, or zinc oxide in any one month on rated orders.

Fabricators do not have to ship anything on DO orders in excess of the following percentages: Zinc base alloys, 20 pct; zinc sheet, strip, wire, rod, shapes (rolled, drawn and extruded), and plate, 15 pct each.

Without specific NPA direction, no dealer need accept rated orders in excess of 15 pct of the total zinc, zinc dust, zinc oxide and zinc products which are available to him during any one month.

NPA, in this order, also provides for the setting up of production and delivery programs when needed. Provisions are included for the assistance of those who have trouble in placing rated orders, for adjustments and exceptions, communications, reports and violations.

Secondary Aluminum Boosted

Following a few days after the NPA's issuance of the civilian aluminum cutback order, secondary aluminum ingots were increased in price. It remains to be seen whether the primary aluminum producers will place any added emphasis on the production of the more profitable mill products or not. If they do and the foundries have added difficulty in obtaining the metal in ingot form, the market for secondary ingots will become still stronger.

Dealers' buying prices for scrap aluminum are also quoted 1¢ higher this week, reflecting the secondary ingot increase.

No. 2 copper scrap is now bringing the dealers 26½¢ to 26¾¢ per lb, a slight dip. Fast delivery is commanding a higher price, but the trend is downward. Zinc scrap is strong but there has been no price change.

Within 6 months all of the U. S. primary aluminum capacity should be producing. That is the time it will take to get the Aluminum Co. of America plants at Massena, N. Y., and Badin, N. C., into full-scale operation as planned by Washington.

The capacity of these two high-cost-power plants totals 158 million lb annually. The government stockpile is to receive 110 million lb during 1951 and the full 158 million lb each year thereafter. A goal of 1.5 billion lb of aluminum for the stockpile is set the next 5 years.

To reach this goal, the government will have to purchase an additional 151 million lb each year for the 5-year period. Immediate prospects for this additional metal are increased imports and the 35 pct reduction in the civilian use of aluminum which is to go into effect on Jan. 1, 1951.

The recently rejected Canadian offer was for 67.6 million lb in 1951, 108 million lb in 1952, and 182 million lb in 1953. Main objection to this by some members of the U. S. aluminum industry was that, if accepted, it would have called for Canadian expansion rather than for expansion in this country.

Calls for U. S. Expansion

As it now stands, the government is calling for an expansion of American aluminum capacity totaling 1 billion lb per year or more.

At press time, negotiations between the government and Alcoa had not been completed. The high-cost electric power available to these plants will require a premium of approximately 6¢ per lb of metal produced and Alcoa has offered to divide this with the government. Whether or not the government is planning to accept this added cost is not known at present.

NONFERROUS METALS PRICES

	Nov. 15	Nov. 16	Nov. 17	Nov. 18	Nov. 20	Nov. 21
Copper, electro, Conn.	24.50	24.50	24.50	24.50	24.50	24.50
Copper, Lake, delivered	24.625	24.625	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.36	$1.32	$1.32	....	$1.37	$1.45*
Zinc, East St. Louis	17.50	17.50	17.50	17.50	17.50	17.50
Lead, St. Louis	16.80	16.80	16.80	16.80	16.80	16.80

Note: Quotations are going prices.

*Tentative.

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.188 in., 2S, 3S, 30.1¢; 4S, 61S-O, 32¢; 52S, 34.1¢; 24S-O, 24S-OAL, 32.9¢; 75S-O, 75S-OAL, 39.9¢; 0.081 in., 2S, 3S, 31.2¢; 4S, 61S-O, 33.5¢; 52S, 35.6¢; 24S-O, 24S-OAL, 34.1¢; 75S-O, 75S-OAL, 41.6¢; 0.032 in., 2S, 3S, 32.9¢; 4S, 61S-O, 37.1¢; 52S, 39.8¢; 24S-O, 24S-OAL, 41.7¢; 75S-O, 75S-OAL, 52.2¢.

Plate: ¼ in. and heavier: 2S, 3S-F, 28.2¢; 4S-F, 30.2¢; 52S-F, 31.8¢; 61S-O, 30.8¢; 24S-O, 24S-OAL, 32.4¢; 75S-O, 75S-OAL, 38.8¢.

Extruded Solid Shapes: Shape factors 1 to 5, 36.2¢ to 74.5¢; 12 to 14, 36.9¢ to 89¢; 24 to 26, 39.6¢ to $1.16; 36 to 38, 47.2¢ to $1.70.

Rod, Rolled: 1.5 to 4.5 in., 2S-F, 3S-F, 37.5¢ to 33.5¢; cold-finished, 0.375 to 3 in., 2S-F, 3S-F, 40.5¢ to 35¢.

Screw Machine Stock: Rounds, 11S-T3, ⅛ to 11/32 in., 53.5¢ to 42¢; ⅜ to 1½ in., 41.5¢ to 39¢; 1 9/16 to 3 in., 38.5¢ to 36¢; 17S-T4 lower by 1.5¢ per lb. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in., 2S, 39.5¢ to 29¢; 52S, 48¢ to 35¢; 56S, 51¢ to 42¢; 17S-T4, 54¢ to 37.5¢; 61S-T4, 48.5¢ to 37¢; 75S-T6, 84¢ to 67.5¢.

Extruded Tubing, Rounds: 63S-T5, OD in in.: 1¼ to 2, 37¢ to 54¢; 2 to 4, 33.5¢ to 45.5¢; 4 to 6, 34¢ to 41.5¢; 6 to 9, 34.5¢ to 43.5¢.

Roofing Sheet, Flat: 0.019 in. x 28 in. per sheet, 72 in., $1.142; 96 in., $1.522; 120 in., $1.902; 144 in., $2.284. Gage 0.024 in. x 28 in., 72 in., $1.379; 96 in., $1.839; 120 in., $2.299; 144 in., $2.759. Coiled Sheet: 0.019 in. x 28 in., 23.2¢ per lb; 0.024 in. x 28 in., 26.9¢ per lb.

Magnesium

(F.o.b. mill, freight allowed)

Sheet and Plate: FS1-O. ¼ in. 63¢; 3/16 in. 65¢; ⅛ in. 67¢; B & S Gage 10, 68¢; 12, 72¢; 14, 78¢; 16, 86¢; 18, 93¢; 20, $1.05; 22, $1.27; 24, $1.67. Specification grade higher. Base: 10,000 lb.

Extruded Round Rod: M, diam in., ¼ to 0.311 in., 74¢; ⅜ to ¾ in., 57.5¢; 1¼ to 1.749 in., 53¢; 2½ to 5 in., 48.5¢. Other alloys higher. Base: Up to ¾ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes, Rectangles: M. In weight per ft, for perimeters less than size indicated, 0.10 to 0.11 lb, 3.5 in., 62.3¢; 0.22 to 0.25 lb, 5.9 in., 59.3¢; 0.50 to 0.59 lb, 8.6 in., 56.7¢; 1.8 to 2.59 lb, 19.5 in., 53.8¢; 4 to 6 lb, 28 in., 49¢. Other alloys higher. Base, in weight per ft of shape: Up to ⅓ lb, 10,000 lb; ⅓ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ in. to 5/16, $1.40; 5/16 to ⅜, $1.26; ½ to ⅝, 93¢; 1 to 2 in., 76¢; 0.165 to 0.219, ⅝ to ¾, 61¢; 1 to 2 in., 57¢; 3 to 4 in., 56¢. Other alloys higher. Base, OD in in.: Up to 1½ in., 10,000 lb; 1½ in. to 3 in., 20,000 lb; 3 in. and larger, 30,000 lb.

Titanium

(10,000 base, f.o.b. mill)

Commercially pure and alloy grades: Sheet and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel and Monel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel
Sheets, cold-rolled	69	53
Strip, cold-rolled	75	56
Rods and bars	65	51
Angles, hot-rolled	65	51
Plates	67	52
Seamless tubes	98	86
Shot and blocks	..	46

Copper, Brass, Bronze

(Freight prepaid on 200 lb includes duty)

	Sheets	Rods	Extruded Shapes
Copper	41.03	....	40.63
Copper, h-r	....	36.88	....
Copper, drawn	....	38.18	....
Low brass	39.15	38.84	....
Yellow brass	38.28	37.97	....
Red brass	40.14	39.83	....
Naval brass	43.08	38.61	38.07
Leaded brass	....	32.63	36.70
Com'l bronze	41.13	40.82	....
Mang. bronze	45.96	40.65	41.41
Phos. bronze	60.20	60.45	....
Muntz metal	40.43	36.74	37.99
Ni silver, 10 pct	49.27	51.49	....
Arch. bronze	....	....	35.11

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	19.00
Aluminum pig	18.00
Antimony, American, Laredo, Tex.	32.00
Beryllium copper, 3.75-4.25% Be	$1.56
Beryllium aluminum 5% Be, dollars per lb contained Be	$69.00
Bismuth, ton lots	$2.25
Cadmium, del'd	$2.40
Cobalt, 97-99% (per lb)	$1.80 to $1.87
Copper, electro, Conn. Valley	24.50
Copper, Lake, delivered	24.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$200
Lead, St. Louis	16.80
Lead, New York	17.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb	24.50
Magnesium, sticks, 100 to 500 lb	42.00 to 44.00
Mercury, dollars per 76-lb flask	
f.o.b. New York	$100 to $110
Nickel, electro, f.o.b. New York	51.22
Nickel oxide sinter, f.o.b. Copper Cliff, Ont., contained nickel	44.25
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$90 to $93
Silver, New York, cents per oz.	80.00
Tin, New York	$1.45
Titanium, sponge	$5.00
Zinc, East St. Louis	17.50
Zinc, New York	18.22
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot	
No. 115	29.00
No. 120	28.50
No. 123	28.00
80-10-10 ingot	
No. 305	35.00
No. 315	32.00
88-10-2 ingot	
No. 210	47.50
No. 215	44.50
No. 245	37.00
Yellow ingot	
No. 405	25.50
Manganese bronze	
No. 421	32.75

Aluminum Ingot

(Cents per lb, 30,000 lb lots)

95-5 aluminum-silicon alloys	
0.30 copper, max.	33.75-34.25
0.60 copper, max.	33.50-34.00
Piston alloys (No. 122 type)	31.50-32.00
No. 12 alum. (No. 2 grade)	30.75-31.25
108 alloy	31.25-31.75
195 alloy	32.75-33.25
13 alloy	34.00-34.50
AXS-679	31.25-31.75

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95-97½%	32.50-33.00
Grade 2—92-95%	30.75-31.50
Grade 3—90-92%	30.00-30.50
Grade 4—85-90%	29.50-30.00

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	39⅛
Electrodeposited	33¾
Rolled, oval, straight, delivered	38⅞
Forged ball anodes	43
Brass, 80-20	
Cast, oval, 15 in. or longer	34¾
Zinc, oval	26½
Ball anodes	35½
Nickel 99 pct plus	
Cast	68.00
Rolled, depolarized	69.00
Cadmium	$2.65
Silver 999 fine, rolled, 100 oz lots, per troy oz, f.o.b. Bridgeport, Conn.	79½

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	53.15
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt allowed	20½
Nickel chloride, 375 lb drum	27½
Silver cyanide, 100 oz lots, per oz.	61¼
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drums	45.85

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add ½¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	23	22¼
Yellow brass	20½	18⅝
Red brass	21½	20⅝
Comm. bronze	21⅝	21
Mang. bronze	19½	18⅝
Brass rod ends	19⅞	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	21.75
No. 2 copper wire	20.75
Light copper	19.75
Refinery brass	21.00*
Radiators	17.50

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper wire	21.75
No. 2 copper wire	20.75
Light copper	19.75
No. 1 composition	22.50
No. 1 comp. turnings	22.00
Rolled brass	19.00
Brass pipe	21.00
Radiators	17.75
Heavy yellow brass	17.50
Aluminum	
Mixed old cast	20
Mixed old clips	21
Mixed turnings, dry	19½
Pots and pans	20
Low copper	22½

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass	
No. 1 heavy copper and wire	24½—25
No. 2 heavy copper and wire	22½—23
Light copper	21 —21½
New type shell cuttings	21 —21½
Auto radiators (unsweated)	15¼—15½
No. 1 composition	18¾—19
No. 1 composition turnings	18¼—18⅓
Clean red car boxes	16¾—17
Cocks and faucets	16¾—17
Mixed heavy yellow brass	13½—14
Old rolled brass	15 —15½
Brass pipe	17¾—18
New soft brass clippings	18½—19
Brass rod ends	17½—18
No. 1 brass rod turnings	17 —17½
Aluminum	
Alum. pistons and struts	12½—13
Aluminum crankcases	15½—16
2S aluminum clippings	19 —19½
Old sheet and utensils	15½—16
Borings and turnings	13
Misc. cast aluminum	15½—16
Dural clips (24S)	15½—16
Zinc	
New zinc clippings	14½—15
Old zinc	11¼—11½
Zinc routings	8½— 9
Old die cast scrap	8¼— 8¾
Nickel and Monel	
Pure nickel clippings	60 —65
Clean nickel turnings	57 —60
Nickel anodes	60 —65
Nickel rod ends	60 —65
New Monel Clippings	22 —25
Clean Monel turnings	18 —20
Old sheet Monel	20 —22
Inconel clippings	26 —28
Nickel silver clippings, mixed	13 —14
Nickel silver turnings, mixed	12 —13
Lead	
Soft scrap, lead	14¼—14¾
Battery plates (dry)	8½— 8¾
Magnesium	
Segregated solids	9 —10
Castings	5½— 6½
Miscellaneous	
Block tin	85 —90
No. 1 pewter	65 —68
No. 1 auto babbitt	58 —60
Mixed common babbitt	13½—14
Solder joints	19 —20
Siphon tops	58 —60
Small foundry type	17 —17½
Monotype	16 —16½
Lino. and stereotype	15 —15½
Electrotype	13¾—14¼
Hand picked type shells	11½—11¾
Lino. and stereo. dross	8 — 8¼
Electro. dross	6½— 6¾

MARKETS—PRICES—TRENDS

SCRAP
Iron & Steel

Scrap Kettle Still Boils but Prices Hold

Not that the lid has been clamped on the boiling scrap market kettle, but the overall picture this week did not feature sharp and rapid-fire advances. Except for extraordinary strength in some railroad items, most prices held the line, but the market did not lose any of its underlying steam.

The span between the formula and broker's offering prices was lengthening in Chicago. Brokers offered up to $43 for No. 1 heavy and $41 for No. 2. In Pittsburgh, small mills watched their scrap stocks shrink. Railroad specialties climbed $2 here. In Chicago railroad steel car axles vaulted $7 to a top of $100 and in St. Louis standard steel car axles were the hottest item on the scrap list, moving $5 to a ceiling of $95.

Detroit still held the wide formula-conversion range of $37.50 to $45 on No. 1 bundles but it was estimated 90 pct of scrap moved at formula. Cleveland and Valley shipments of openhearth grades dropped under 50 pct of pre-formula tonnage.

PITTSBURGH — Upgrading of heavy melting grades was general here. The formula still held although small mills were having a tough time of it on quality and quantity. Paying of springboards was helping some, but small consumers were losing inventory. It would not be surprising if the formula were raised when finished steel prices go up. It is doubtful this would help much. Machine shop turnings were stronger. Railroad specialties were up $2.

CHICAGO—The spread between formula prices and broker's offering is getting wider in the Chicago market. Brokers are offering up to $43.00 and $41.00 per gross ton for No. 1 and No. 2 heavy melting steel against formula prices of $40.00 and $38.00. Blast furnace grades are stronger with increases ranging from 50¢ to $1.00 per gross ton. Cast grades are all over the lot with prices varying according to the urgency of the consumers needs.

PHILADELPHIA — There are reports this week of mill rejections of upgraded No. 1 steel which indicates laxity of consumers' inspections is disappearing. Prices are more stable and the only increases are in chemical borings, RR specialties, cast iron carwheels and malleable cast. The market is still very strong and some dealers are holding back material. However, some people in the trade believe that cast scrap prices have reached a plateau.

NEW YORK—Demand for scrap was strong in all directions here but prices were undisturbed from last week's levels. Clean cast chemical borings were becoming scarcer with strong demand continuing at going prices. Some feel that more heavy melting should be coming from this area, considering the fast and furious mill pace.

DETROIT—As reflected in THE IRON AGE in recent weeks, the Detroit market has done a flip flop. Before the mills adopted a policy of holding the price line, Detroit industrial scrap was bringing a substantial premium compared with yard scrap. Today, the situation in reversed. Yard scrap free to move outside allocation limits is bringing premiums ranging $3.50 per ton over formula. Tonnage moving at these prices is small. In a free market such deals would not carry great weight. As a reflection of today's market, these transactions have significance. The low price is the formula at which probably 90 pct of Detroit scrap is moving. Top figure is the price being paid for a small tonnage needed for conversion or to cover a short interest. While steel scrap continues in high demand, the cast iron market has softened under impact of imported scrap.

CLEVELAND—Shipments of openhearth grades here and in the Valley have dropped to less than 50 pct of the pre-formula volume. According to brokers, "You have to have a pal to sell you a car of scrap at the formula." On the other hand, mills here and in the Valley are holding firm and getting primarily allocated and earmarked tonnage. This will not be enough, even with the substantial amount of home scrap being generated. Mills will probably do nothing until the first of the month. Foundry grades are strong.

ST. LOUIS—Standard steel car axles, hottest item in the scrap iron list in the market here, advanced another $5 a ton during the week to bring it to $90 to $95, highest since 1948 when it reached $110. The item is in short supply and heavy demand, and some of it is going into conversion deals. Foundry grades generally are in strong demand, with supply limited. Melting grades are being held to formula price by the steel mills, but it is understood brokers are paying more and shipping to other markets.

CINCINNATI — Some tonnage moved quietly out of this district this week, probably marking the start of raiding and possibly the beginning of the end of the formula here. Brokers can not buy much local tonnage at the formula and district mills will come in for their December requirements within 10 days. Dealers continue to sell regularly but are holding sales to small lots. Foundry grades are very strong and according to the trade, showing the real strength of the market.

BOSTON—Formula prices continued to hold the market here. Fairly good activity was reported but prices did not show sharp changes. Cast was again strong. Mixed cupola advanced to a top of $42 and heavy breakable to a top of $40. Machine shop turnings moved up 50¢.

BIRMINGHAM — Scrap dealers and brokers are finding it hard to buy scrap in this district and are seeking it in other areas to fill orders. Some mills have built up fair stockpiles and are resisting prices, but others are buying all they can get. No. 1 busheling advanced $1.50 to $37.00 this week, while angles and splice bars rose $2.00 to $60.00.

BUFFALO—New sales in steelmaking grades of scrap at prices above the formula range are reported. Smaller consumers are doing the buying. Stronger tendencies are prevailing in other sections of the market. Despite the tremendous usage of scrap, mills are still able to display huge reserve stocks.

Tony's CONFIDENCE Comes from Al's ACCURACY

Antonio Coputo assembles gasoline pump meters in the plant of Gilbert & Barker Mfg. Co.

Tony's employers have provided him with the best possible equipment to do his work well, speedily and with the least amount of effort.

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Alfred Robbins operates RB&W's latest wire-drawing equipment. He oversees a process which is vital to quality, for RB&W draws its own wire, using tungsten carbide dies, in order to insure closest tolerances for cold-heading.

By this and other means of controlling raw materials, men like Alfred Robbins insure the accurate dimensions of RB&W fasteners . . . so that men like Tony Coputo can work with perfect confidence in their fasteners.

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105 Years Making Strong the Things That Make America Strong

Iron and Steel

SCRAP PRICES

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$43.50 to $44.00
No. 2 hvy. melting	40.50 to 41.00
No. 1 bundles	46.00 to 46.50
No. 2 bundles	38.50 to 39.00
Machine shop turn.	35.50 to 36.00
Mixed bor. and ms. turns.	35.50 to 36.00
Shoveling turnings	37.50 to 38.00
Cast iron borings	37.00 to 37.50
Low phos. plate	53.50 to 54.00
Heavy turnings	46.00 to 46.50
No. 1 RR. hvy. melting	44.00 to 45.00
Scrap rails, random lgth.	63.00 to 63.50
Rails 2 ft and under	67.00 to 68.00
RR. steel wheels	61.00 to 62.00
RR. spring steel	61.00 to 62.00
RR. couplers and knuckles	61.00 to 62.00
No. 1 machinery cast	60.50 to 61.00
Mixed yard cast.	54.50 to 55.00
Heavy breakable cast	51.50 to 52.00
Malleable	68.00 to 70.00

Chicago

No. 1 hvy. melting	$39.50 to $40.00
No. 2 hvy. melting	37.50 to 38.00
No. 1 factory bundles	39.50 to 40.00
No. 1 dealers' bundles	39.50 to 40.00
No. 2 dealers' bundles	34.00 to 35.00
Machine shop turn.	34.50 to 35.00
Mixed bor. and turn.	34.50 to 35.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	34.50 to 35.00
Low phos. forge crops	54.00 to 55.00
Low phos. plate	52.00 to 54.00
No. 1 RR. hvy. melting	46.50 to 47.50
Scrap rails, random lgth.	59.00 to 60.00
Rerolling rails	65.00 to 66.00
Rails 2 ft and under	65.50 to 66.50
Locomotive tires, cut	57.00 to 58.00
Cut bolsters & side frames	54.00 to 55.00
Angles and splice bars	62.00 to 63.00
RR. steel car axles	95.00 to 100.00
RR. couplers and knuckles	57.00 to 58.00
No. 1 machinery cast.	61.00 to 62.00
No. 1 agricul. cast.	55.00 to 56.00
Heavy breakable cast.	50.00 to 51.00
RR. grate bars	46.00 to 47.00
Cast iron brake shoes	48.50 to 49.50
Cast iron car wheels	56.00 to 57.00
Malleable	71.00 to 72.00

Philadelphia

No. 1 hvy. melting	$38.50 to $39.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 bundles	38.50 to 39.00
No. 2 bundles	31.00 to 32.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	26.00 to 27.00
Shoveling turnings	32.00 to 33.00
Low phos. punchings, plate	49.00 to 50.00
Low phos. 5 ft and under	48.00 to 49.00
Low phos. bundles	45.00 to 46.00
Hvy. axle forge turn.	38.50 to 39.00
Clean cast chem. borings	41.00 to 42.00
RR. steel wheels	53.00 to 54.00
RR. spring steel	53.00 to 54.00
Rails 18 in. and under	66.00 to 67.00
No. 1 machinery cast.	55.00 to 56.00
Mixed yard cast.	49.00 to 51.00
Heavy breakable cast.	49.00 to 50.00
Cast iron carwheels	62.00 to 63.00
Malleable	65.00 to 67.00

Cleveland

No. 1 hvy. melting	$43.00 to $43.50
No. 2 hvy. melting	40.00 to 40.50
No. 1 busheling	43.00 to 43.50
No. 1 bundles	43.00 to 43.50
No. 2 bundles	28.00 to 28.50
Machine shop turn.	35.00 to 35.50
Mixed bor. and turn.	36.00 to 36.50
Shoveling turnings	37.00 to 37.50
Cast iron borings	37.00 to 37.50
Low phos. 2 ft and under	45.50 to 46.00
Steel axle turn.	43.00 to 43.50
Drop forge flashings	43.00 to 43.50
No. 1 RR. hvy. melting	43.50 to 44.00
Rails 3 ft and under	69.00 to 70.00
Rails 18 in. and under	70.00 to 71.00
No. 1 machinery cast.	64.00 to 65.00
RR. cast.	64.50 to 65.00
RR. grate bars	46.00 to 47.00
Stove plate	51.00 to 52.00
Malleable	69.00 to 70.00

Youngstown

No. 1 hvy. melting	$43.50 to $44.00
No. 2 hvy. melting	40.50 to 41.00
No. 1 bundles	43.50 to 44.00
No. 2 bundles	$38.50 to $39.00
Machine shop turn.	36.50 to 36.00
Shoveling turnings	37.50 to 38.00
Cast iron borings	37.50 to 38.00
Low phos. plate	46.00 to 46.50

Buffalo

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	37.50 to 38.50
No. 1 busheling	37.50 to 38.50
No. 1 bundles	39.50 to 40.00
No. 2 bundles	36.00 to 36.50
Machine shop turn.	32.00 to 33.00
Mixed bor. and turn.	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	35.00 to 36.00
Low phos. plate	46.00 to 47.00
Scrap rails, random lgth.	52.00 to 53.00
Rails 2 ft and under	59.00 to 61.00
RR. steel wheels	52.00 to 53.00
RR. spring steel	52.00 to 53.00
RR. couplers and knuckles	52.00 to 53.00
No. 1 machinery cast.	52.00 to 54.00
No. 1 cupola cast.	49.00 to 50.00
Small indus. malleable	60.00 to 62.00

Birmingham

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	33.00 to 34.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	30.00 to 31.00
Cast iron borings	25.00 to 26.00
Bar crops and plate	44.00 to 45.00
Structural and plate	44.00 to 45.00
No. 1 RR. hvy. melting	41.00 to 42.00
Scrap rails, random lgth.	56.00 to 57.00
Rerolling rails	59.00 to 60.00
Rails 2 ft and under	64.00 to 65.00
Angles & splice bars	59.00 to 60.00
Std. steel axles	61.00 to 62.00
No. 1 cupola cast.	58.00 to 59.00
Stove plate	53.00 to 54.00
Cast iron carwheels	46.00 to 47.00

St. Louis

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	36.00 to 37.00
No. 2 bundled sheets	36.00 to 37.00
Machine shop turn.	28.50 to 29.50
Shoveling turnings	32.00 to 33.00
Rails, random lengths	55.00 to 57.00
Rails 3 ft and under	63.00 to 65.00
Locomotive tires, uncut	53.00 to 54.00
Angles and splice bars	59.00 to 61.00
Std. steel car axles	90.00 to 95.00
RR. spring steel	55.00 to 57.00
No. 1 machinery cast.	58.00 to 60.00
Hvy. breakable cast.	45.00 to 47.00
Cast iron brake shoes	46.00 to 48.00
Stove plate	44.00 to 45.00
Cast iron car wheels	58.00 to 60.00
Malleable	65.00 to 66.00

New York

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$34.50
No. 2 hvy. melting	$29.00 to 30.00
No. 2 bundles	28.50 to 29.00
Machine shop turn.	25.50 to 26.00
Mixed bor. and turn.	25.50 to 26.00
Shoveling turnings	27.50 to 28.00
Clean cast chem. bor.	34.50 to 35.50
No. 1 machinery cast.	48.00 to 48.50
Mixed yard cast.	43.00 to 44.00
Charging box cast.	43.00 to 44.00
Heavy breakable cast.	43.00 to 44.00
Unstrp. motor blocks	38.00 to 39.00

Boston

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$32.50
No. 2 hvy. melting	$29.50 to 29.92
No. 1 bundles	32.50
No. 2 bundles	$28.00 to $29.00
Machine shop turn.	24.50 to 25.00
Mixed bor. and turn.	24.00 to 24.50
Shoveling turnings	26.00 to 26.50
No. 1 busheling	34.92
Clean cast chem. borings	30.00 to 31.00
No. 1 machinery cast.	46.00 to 47.00
Mixed cupola cast.	41.00 to 42.00
Heavy breakable cast.	39.00 to 40.00
Stove plate	39.50 to 40.50

Detroit

Brokers' buying prices per gross ton, on cars

No. 1 hvy. melting	$37.50 to $39.50
No. 2 hvy. melting	32.50 to 36.00
No. 1 bundles	37.50 to 45.00
New busheling	37.50 to 42.00
Flashings	37.00 to 37.50
Machine shop turn.	29.00 to 29.50
Mixed bor. and turn.	29.00 to 29.50
Shoveling turnings	31.50 to 34.00
Cast iron borings	31.50 to 34.00
Low phos. plate	40.00 to 45.00
No. 1 cupola cast.	60.00 to 62.00
Heavy breakable cast.	51.00 to 53.00
Stove plate	51.00 to 52.00
Automotive cast.	64.00 to 66.00

Cincinnati

Per gross ton, f.o.b. cars:

No. 1 hvy. melting	$42.00 to $42.50
No. 2 hvy. melting	39.00 to 39.50
No. 1 bundles	42.00 to 42.50
No. 2 bundles, black	39.00 to 39.50
No. 2 bundles, mixed	32.50 to 33.00
Machine shop turn.	28.50 to 29.00
Mixed bor. and turn.	30.50 to 31.00
Shoveling turnings	31.50 to 32.00
Cast iron borings	31.50 to 32.00
Low phos. 18 in. under	55.00 to 56.00
Rails, random lengths	62.00 to 63.00
Rails, 18 in. and under	69.00 to 70.00
No. 1 cupola cast.	64.00 to 65.00
Hvy. breakable cast.	51.00 to 52.00
Drop broken cast.	66.00 to 67.00

San Francisco

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	28.00
No. 1 bundles	30.00
No. 2 bundles	28.00
No. 3 bundles	25.00
Machine shop turn.	16.00
Elec. fur. 1 ft and under	$40.00 to 42.00
No. 1 RR. hvy. melting	30.00
Scrap rails random lgth.	30.00
No. 1 cupola cast.	43.00 to 46.00

Los Angeles

No. 1 hvy. melting	$30.00
No. 2 hvy. melting	28.00
No. 1 bundles	30.00
No. 2 bundles	28.00
No. 3 bundles	25.00
Mach. shop turn.	16.00
Elec. fur. 1 ft and under	$42.00 to 45.00
No. 1 RR. hvy. melting	30.00
Scrap rails, random lgth.	30.00
No. 1 cupola cast.	48.00 to 50.00

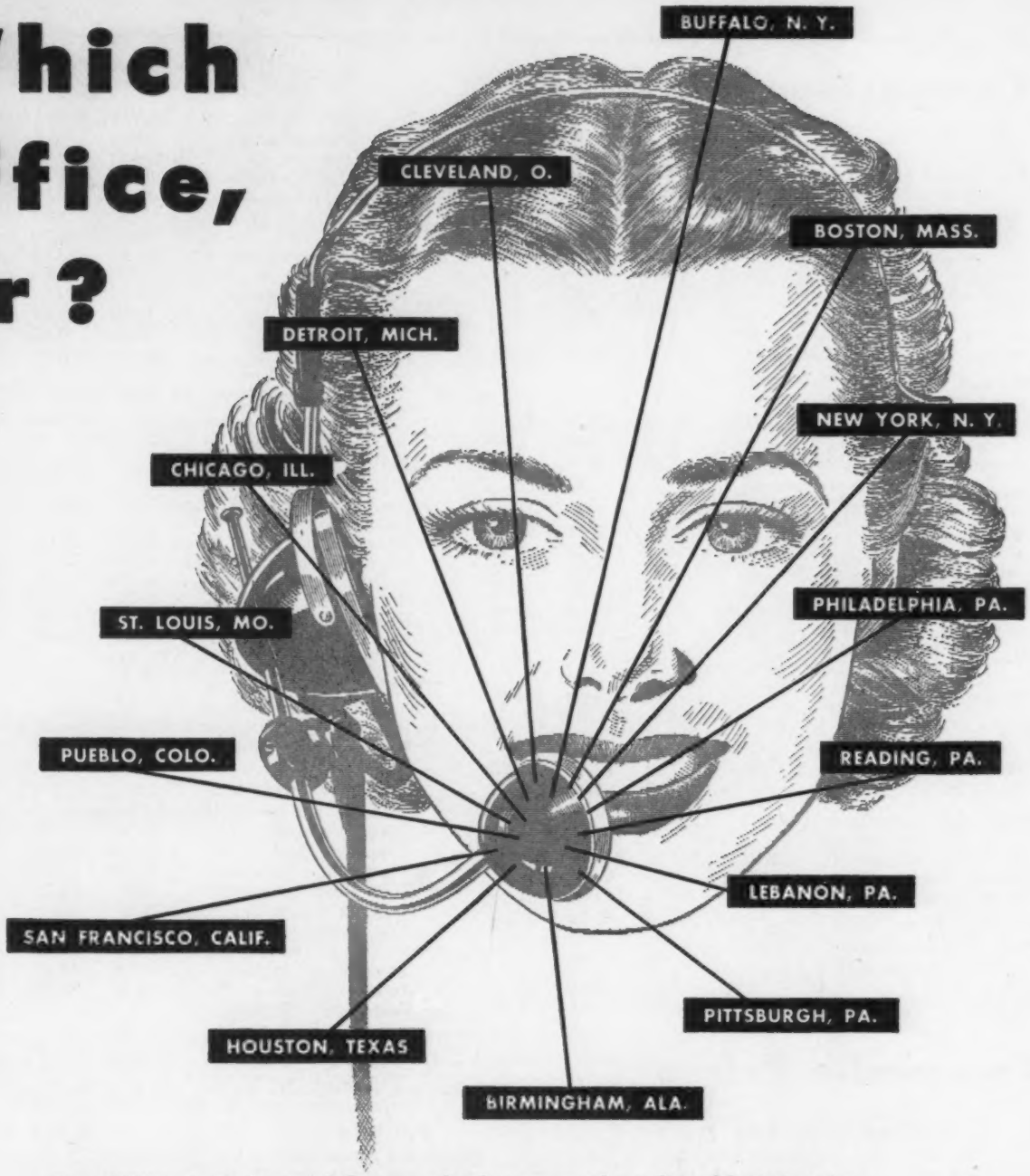
Seattle

No. 1 hvy. melting	$24.00 to $25.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 bundles	22.00
No. 2 bundles	22.00
No. 3 bundles	18.00
Elec. fur. 1 ft and under	$30.00 to 30.00
RR. hvy. melting	25.00
No. 1 cupola cast	25.00
Heavy breakable cast.	25.00

Hamilton, Ont.

No. 1 hvy. melting	$30.00
No. 1 bundles	30.00
No. 2 bundles	29.50
Mechanical bundles	28.00
Mixed steel scrap	26.00
Mixed bor. and turn.	23.00
Rails, remelting	30.00
Rails, rerolling	33.00
Bushelings	24.50
Bush., new fact., prep'd.	29.00
Bush., new fact., unprep'd.	23.00
Short steel turnings	23.00
Cast scrap	45.00

Which office, sir?



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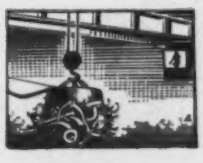

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HOUSTON, TEXAS 1114 Texas Av. Bldg.
PITTSBURGH, PA. Oliver Bldg.
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SAN FRANCISCO, CAL. Pacific Gas & Elec. Co. Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices

Steel prices in this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat Rolled Steel: (cents per pound)	Nov. 21, 1950	Nov. 14, 1950	Oct. 24, 1950	Nov. 22 1949
Hot-rolled sheets	3.35	3.35	3.35	3.25
Cold-rolled sheets	4.10	4.10	4.10	4.00
Galvanied sheets (10 ga)	4.40	4.40	4.40	4.40
Hot-rolled strip	3.25	3.25	3.25	3.25
Cold-rolled strip	4.21	4.21	4.21	4.038
Plate	3.50	3.50	3.50	3.40
Plates wrought iron	7.85	7.85	7.85	7.85
Stains C-R-strip (No. 302)	34.50	34.50	34.50	33.00
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes.	$7.50	$7.50	$7.50	$7.75
Tinplate, electro (0.50 lb)	6.60	6.60	6.60	6.70
Special coated mfg. ternes	6.35	6.35	6.35	6.65
Bars and Shapes: (cents per pound)				
Merchant bars	3.45	3.45	3.45	3.35
Cold finished bars	4.15	4.15	4.15	3.995
Alloy bars	3.95	3.95	3.95	3.75
Structural shapes	3.40	3.40	3.40	3.25
Stainless bars (No. 302)	30.00	30.00	30.00	28.50
Wrought iron bars	9.50	9.50	9.50	9.50
Wire: (cents per pound)				
Bright wire	4.50	4.50	4.50	4.15
Rails: (dollars per 100 lb)				
Heavy rails	$3.40	$3.40	$3.40	$3.20
Light rails	3.75	3.75	3.75	3.55
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$54.00	$54.00	$54.00	$52.00
Slabs, rerolling	54.00	54.00	54.00	52.00
Forging billets	63.00	63.00	63.00	61.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	63.00
Wire Rod and Skelp: (cents per pound)				
Wire rods	3.85	3.85	3.85	3.40
Skelp	3.15	3.15	3.15	3.25

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*

Pig Iron: (per gross ton)	Nov. 21, 1950	Nov. 14, 1950	Oct. 24, 1950	Nov. 22 1949
No. 2, foundry, del'd Phila.	$54.77	$54.77	$52.77	$50.42
No. 2, Valley furnace	49.50	49.50	49.50	46.50
No. 2, Southern Cin'ti	52.58	52.58	52.58	46.08
No. 2, Birmingham	45.88	45.88	45.88	39.38
No. 2, foundry, Chicago†	49.50	49.50	49.50	46.50
Basic del'd Philadelphia	53.92	53.92	51.92	49.92
Basic, Valley furnace	49.00	49.00	49.00	46.00
Malleable, Chicago†	49.50	49.50	49.50	46.50
Malleable, Valley	49.50	49.50	49.50	46.50
Charcoal, Chicago	70.56	70.56	70.56	68.56
Ferromanganese‡	181.20	178.60	173.40	173.40

†The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡Average of U. S. prices quoted on Ferroalloy page.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$43.75	$43.75	$43.75	$33.75
Heavy melt'g steel, Phila.	38.75	38.75	38.50	25.50
Heavy melt'g steel, Ch'go	39.75	39.75	39.75	30.50
No. 1 hy. com. sh't, Det.	41.25	39.75	37.25	30.50
Low phos. Young'n	46.25	46.25	46.25	36.75
No. 1 cast, Pittsburgh	60.75	60.75	55.75	39.50
No. 1 cast, Philadelphia	55.50	55.50	51.50	38.00
No. 1 cast, Chicago	61.50	60.50	55.50	44.50
Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.25	$14.25	$14.25	$14.25
Foundry coke, prompt	16.75	16.75	16.75	15.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	24.50	24.50	24.50	18.50
Copper, Lake, Conn.	24.625	24.625	24.625	18.625
Tin Straits, New York	$1.38†	$1.375*	$1.175	85.00
Zinc, East St. Louis	17.50	17.50	17.50	9.75
Lead, St. Louis	16.80	16.80	15.80	11.80
Aluminum, virgin	19.00	19.00	19.00	17.00
Nickel, electrolytic	51.22	51.22	51.22	42.97
Magnesium, ingot	24.50	24.50	24.50	20.50
Antimony, Laredo, Tex.	32.00	32.00	32.00	32.00

†Tentative. *Revised.

Composite Prices

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 180 of May 12, 1949, issue.)

	Finished Steel Base Price	Pig Iron	Scrap Steel
Nov. 21, 1950	3.837¢ per lb.	$49.69 per gross ton	$40.75 per gross ton
One week ago	3.837¢ per lb.	49.69 per gross ton	40.75 per gross ton
One month ago	3.837¢ per lb.	49.36 per gross ton	40.67 per gross ton
One year ago	3.705¢ per lb.	45.88 per gross ton	29.92 per gross ton

	Finished Steel Base Price High		Finished Steel Base Price Low		Pig Iron High		Pig Iron Low		Scrap Steel High		Scrap Steel Low	
1950	3.837¢	Jan. 3	3.837¢	Jan. 3	$49.69	Nov. 7	$45.88	Jan. 3	$41.67	Nov. 7	$26.25	Jan. 3
1949	3.837¢	Dec. 27	3.3705¢	May 3	46.87	Jan. 18	45.88	Sept. 6	43.00	Jan. 4	19.33	June 28
1948	3.721¢	July 27	3.193¢	Jan. 1	46.91	Oct. 12	39.58	Jan. 6	43.16	July 27	39.75	Mar. 9
1947	3.193¢	July 29	2.848¢	Jan. 1	37.98	Dec. 30	30.14	Jan. 7	42.58	Oct. 28	29.50	May 20
1946	2.848¢	Dec. 31	2.464¢	Jar. 1	30.14	Dec. 10	25.37	Jan. 1	31.17	Dec. 24	19.17	Jan. 1
1945	2.464¢	May 29	2.396¢	Jan. 1	25.37	Oct. 23	23.61	Jan. 2	19.17	Jan. 2	18.92	May 22
1944	2.396¢		2.396¢		$23.61		$23.61		19.17	Jan. 11	15.76	Oct. 24
1943	2.396¢		2.396¢		23.61		23.61		$19.17		$19.17	
1942	2.396¢		2.396¢		23.61		23.61		19.17		19.17	
1941	2.396¢		2.396¢		$23.61	Mar. 20	$23.45	Jan. 2	$22.00	Jan. 7	$19.17	Apr. 10
1940	2.30467¢	Jan. 2	2.24107¢	Apr. 16	23.45	Dec. 23	22.61	Jan. 2	21.88	Dec. 30	16.04	Apr. 9
1939	2.35367¢	Jan. 3	2.26689¢	May 16	22.61	Sept. 19	20.61	Sept. 12	22.50	Oct. 3	14.08	May 16
1938	2.58414¢	Jan. 4	2.27207¢	Oct. 18	23.25	June 21	19.61	July 6	15.00	Nov. 22	11.00	June 7
1937	2.58414¢	Mar. 9	2.32263¢	Jan. 4	32.25	Mar. 9	20.25	Feb. 16	21.92	Mar. 30	12.67	June 9
1936	2.32263¢	Dec. 28	2.05200¢	Mar. 10	19.74	Nov. 24	18.73	Aug. 11	17.75	Dec. 21	12.67	June 8
1935	2.07542¢	Oct. 1	2.06492¢	Jan. 8	18.84	Nov. 5	17.83	May 14	13.42	Dec. 10	10.33	Apr. 29
1932	1.89196¢	July 5	1.83910¢	Mar. 1	14.81	Jan. 5	13.56	Dec. 6	8.50	Jan. 12	6.43	July 5
1929	2.31773¢	May 28	2.26498¢	Oct. 29	18.71	May 14	18.21	Dec. 17	17.58	Jan. 29	14.08	Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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IRON AGE

STEEL PRICES

Smaller numbers in price boxes indicate producing companies. For main office locations, see key on facing page.
Base prices at producing points apply only to sizes and grades produced in these areas. Prices are in cents per lb unless otherwise noted. Extras apply.

	Pittsburgh	Chicago	Gary	Cleveland	Canton Massillon	Middletown	Youngstown	Bethlehem	Buffalo	Conshohocken	Johnstown	Sparrows Point	Granite City	Detroit
INGOTS Carbon forging, net ton	$50.00[1]													$50.00[21]
Alloy, net ton	$51.00[1,17]													$51.00[21]
BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton	$53.00[1]	$53.00[1]	$53.00[1]				$57.00[13]		$53.00[3]	$62.00[26]	$53.00[3]			
Carbon forging billets, net ton	$63.00[1]	$63.00[1,4]	$63.00[1,8]	$63.00[4]			$63.00[25]		$63.00[3,4]	$68.00[26]	$63.00[3]			$68.00[21]
Alloy, net ton	$66.00[1,17]	$66.00[1,4]	$66.00[1]		$66.00[4,42]			$66.00[3]	$66.00[3,4]	$70.00[26]	$66.00[3]			$69.00[21]
PIPE SKELP	3.15[1]						3.15[1,4]							
WIRE RODS	3.85[2] 4.05[18]	3.85[2,4,33]	3.85[8]	3.85[2]			3.85[8]				3.85[3]	3.95[3]		
SHEETS Hot-rolled (18 ga. & hvr.)	3.35[1,5,9,15]	3.35[23]	3.35[1,8,8]	3.35[4,5]			3.35[1,4,8] 3.75[13]		3.35[3]	3.60[26]		3.35[3]	4.05[22]	3.55[13] 4.15[47]
Cold-rolled	4.10[1,5,7,9,15] 5.10[53]		4.10[1,8,8]	4.10[4,15]		4.10[7]	4.10[4,8]		4.10[3]			4.10[3]	4.80[22]	4.30[13]
Galvanized (10 gage)	4.40[1,9,15]		4.40[1,8]		4.40[4]		4.75[44] 5.50[54]					4.40[3]		
Enameling (12 gage)	4.40[1]		4.40[1,8]	4.40[4]		4.40[7]	4.40[8] 4.90[76] 5.55[54]						5.10[22]	4.70[13]
Long ternes (10 gage)	4.80[9,15]		4.80[1]			4.80[7]	5.30[54]							
Hi Str. low alloy, h.r.	5.05[1,5] 5.30[9]	5.05[1]	5.05[1,8,8]	5.05[4,5]			5.05[1,4] 5.30[8] 5.40[13]		5.05[3]	5.05[26]		5.05[3]		5.50[13]
Hi str. low alloy, c.r.	6.20[1,5] 6.45[9]		6.20[1,8,8]	6.20[4,5]			6.20[4] 6.45[8]		6.20[3]			6.20[3]		6.85[13]
Hi str. low alloy, galv.	6.75[1]											6.75[3]		
STRIP Hot-rolled	3.25[5,7,9] 3.50[38] 3.75[41,58]	3.25[3,66]	3.25[1,8,8]	3.25[5]			3.25[1,4,8] 3.75[13]		3.25[3]	3.50[26]		3.25[3]		3.45[19] 4.05[47]
Cold-rolled	4.15[5,7,9] 4.85[63,68]	4.30[9] 4.50[66]	4.30[8]	4.15[2,5]		4.15[7]	4.15[4,6,48] 4.85[13,40] 4.75[49]		4.15[3]			4.15[3]		4.35[19] 4.95[47] 5.10[61,63]
Hi str. low alloy, h.r.	5.50[9]		4.95[1,8,8]	4.95[5]			4.95[1,4] 5.20[8] 5.30[13]		4.95[3]	4.95[26]		4.95[3]		5.40[13]
Hi Str. low alloy, c.r.	6.45[9]			6.20[2,5]			6.20[4] 6.45[8] 6.55[13]		6.40[3]			6.40[3]		6.40[13]
TINPLATE† Cokes, 1.50-lb base box 1.25 lb, deduct 20¢	$7.50[1,5,9,15]		$7.50[1,8,8]				$7.50[4]					$7.60[3]	$7.70[22]	
Electrolytic 0.25, 0.50, 0.75 lb box	Deduct $1.15, 90¢ and 65¢ respectively from 1.50-lb coke base box price													
BLACKPLATE, 29 gage Hollowware enameling	5.30[1,5,15]		5.30[1,8]				5.30[4]					5.40[3]	5.50[22]	
BARS Carbon steel	3.45[1,5,9]	3.45[1,4,33]	3.45[1,8,8]	3.45[4]	3.45[4]		3.45[1,4,8]		3.45[3,4]		3.45[3]			3.65[15]
Reinforcing‡	3.45[1,8]	3.45[4]	3.45[1,8,8]	3.45[4]			3.45[1,4,8]		3.45[3,4]		3.45[3]	3.45[3]		
Cold-finished	4.15[2,4,5,17,62,69,71]	4.15[2,23,69,70]	4.15[4,73,74]	4.15[2,61]	4.15[4,32,62]		4.15[8,49,57]		4.15[70]					4.35[19] 4.30[64]
Alloy, hot-rolled	3.95[1,17]	3.95[1,4,33]	3.95[1,8,8]		3.95[4]		3.95[1,8,35]	3.95[3]	3.95[3,4]		3.95[3]			4.25[13] 4.10[21]
Alloy, cold-drawn	4.90[2,17,62,69,71]	4.90[2,23,69,70]	4.90[4,73,74]	4.90[2,61]	4.90[4,62,62]		4.90[8,35,57]	4.90[3]	4.90[3,70]					5.05[64]
Hi str. low alloy, h.r.	5.20[1,5]		5.20[1,8,8]	5.20[4]			5.20[1] 5.45[8]	5.20[3]	5.20[3]		5.20[3]			5.65[13]
PLATE Carbon steel	3.50[1,5]	3.50[1]	3.50[1,8,8]	3.50[4]			3.50[1] 3.75[13]		3.50[3]	3.75[26]	3.50[3]	3.50[3]	4.20[22]	3.75[13]
Floor plates	4.55[1]	4.55	4.55[3]	4.55[5]						4.55[26]				
Alloy	4.40[1]	4.40[1]	4.40[1]				4.75[13]			4.55[26]	4.40	4.40[3]		
Hi Str. low alloy	5.35[1,5]	5.35[1]	5.35[1,8]	5.35[4,5]			5.60[8] 5.70[13]			5.35[26]	5.35[3]	5.35[3]		5.85[13]
SHAPES, Structural	3.40[1,5,9]	3.40[1,33]	3.40[1,8,8]					3.45[3]	3.45[3]		3.45[3]			
Hi str. low alloy	5.15[1,5]	5.15[1]	5.15[1,8,8]				5.40[8]	5.20[3]	5.20[3]		5.20[3]			
MANUFACTURERS' WIRE Bright	4.50[2,5] 4.75[18]	4.50[2,4,12,34] 4.80[33]		4.50[2,77]			4.50[8]	Kokomo—4.60[30]			4.50[3]	4.60[3]	Duluth—4.50[3] Pueblo—4.75[14]	
PILING, Steel Sheet	4.20[1,9]	4.20[1]							4.20[3]					

STEEL PRICES

Smaller numbers indicate producing companies. See key at right. Prices are in cents per lb unless otherwise noted. Extras apply.

Kansas City	Houston	Birmingham	WEST COAST Seattle, San Francisco, Los Angeles, Fontana		
			F=$78.00		INGOTS Carbon forging, net ton
	$59.00[83]		F=$77.00		Alloy, net ton
		$53.00[11]	F=$72.00[19]		BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton
	$71.00[83]	$63.00[11]	F=$82.00[19]	Geneva=$63.00[16]	Carbon forging billets, net ton
	$74.00[83]		F=$85.00[19]		Alloy net ton
					PIPE SKELP
	4.25[83]	3.85[11]	SF=4.50[24] LA=4.85[24-62]	Portsmouth=3.85[20] Worcester=4.15[2]	WIRE RODS
		3.35[4-11]	SF, LA=4.05[24] F=4.25[19]	Ashland=3.35[7] Niles=3.50[64], Geneva=3.45[16]	SHEETS Hot-rolled (18 ga. & hvr.)
		4.10[11]	SF=5.05[24] F=5.00[19]		Cold-rolled
		4.40[4-11]	SF, LA=5.15[24]	Ashland=4.40[7] Kokomo=4.50[30]	Galvanized (10 gage)
		4.40[11]			Enameling (12 gage)
					Long ternes (10 gage)
		5.05[11]	F=6.00[19]		Hi str. low alloy, h.r.
			F=7.05[19]		Hi str. low alloy, c.r.
					Hi str. low alloy, galv.
3.85[83]	3.85[83]	3.25[11]	SF, LA=4.00[24-62] F=4.40[19], S=4.25[62]	Ashland=3.25[7] Atlanta=3.80[65] Minnequa=4.30[14]	STRIP Hot-rolled
			F=5.75[19] LA=5.85[27]	New Haven=4.65[3], 5.35[68] Trenton=5.00[45]	Cold-rolled
		4.95[11]	F=5.90[19]		Hi str. low alloy, h.r.
			F=6.95[19]		Hi str. low alloy, c.r.
		7.80[11]	SF=8.25[24]		TINPLATE Cokes, 1.50-lb base box 1.25 lb, deduct 20¢
Deduct $1.15, 90¢ and 65¢ respectively from 1.50-lb coke base box price					Electrolytic 0.25, 0.50, 0.75 lb box
					BLACKPLATE, 29 gage Hollowware enameling
4.05[83]	3.85[83]	3.45[4-11]	SF, LA=4.15[24] LA=4.15[62]	Atlanta=4.00[65]	BARS Carbon steel
4.05[83]	3.85[83]	3.45[4-11]	SF, S=4.20[62] F=4.10[19]	Atlanta=4.00[65] Minnequa=4.25[14]	Reinforcing‡
				Putnam, Newark=4.55[69]	Cold-finished
4.55[83]	4.35[83]		LA=5.00[62] F=4.95[19]		Alloy, hot-rolled
				Newark,[69] Worcester[3]=5.20 Hartford=5.20[4]	Alloy-, cold-drawn
		5.20[11]	F=6.25[19]		Hi str. low alloy, h.r.
	3.90[83]	3.50[4-11]	F=4.10[19] S=4.40[62] Geneva=3.50[16]	Claymont=3.90[29] Coatesville=3.90[21] Harrisburg=4.25[58]	PLATE Carbon steel
				Harrisburg=5.25[58]	Floor plates
			F=5.40[19]	Coatesville=4.80[21]	Alloy
		5.35[11]	F=5.95[19]	Geneva=5.35[16]	Hi str. low alloy
4.00[83]	3.80[83]	3.40[11]	SF=3.95[62] LA=4.00[24-62]	Phoenixville=4.25[56] Gen'a=3.40[16] Minnequa=3.85[14]	SHAPES, Structural
		5.15[11]	F=4.00[19] S=4.05[62]	Fontana=5.75[19] Geneva=5.15[16]	Hi str. low alloy
5.10[83]	4.90[83]	4.50[4-11]	SF, LA=5.45[24-62-14]	Portsmouth=4.50[20] Worcester=4.80[2]	MANUFACTURERS' WIRE Bright

Notes: †Special coated mfg ternes deduct $1.15 from 1.50-lb coke base box price. Can-making quality blackplate, 55 to 128-lb, deduct $1.90 from 1.50-lb coke base box. ‡Straight lengths only from producer to fabricator.

KEY TO STEEL PRODUCERS

With Principal Offices

1 Carnegie-Illinois Steel Corp., Pittsburgh
2 American Steel & Wire Co., Cleveland
3 Bethlehem Steel Co., Bethlehem
4 Republic Steel Corp., Cleveland
5 Jones & Laughlin Steel Corp., Pittsburgh
6 Youngstown Sheet & Tube Co., Youngstown
7 Armco Steel Corp., Middletown, Ohio
8 Inland Steel Co., Chicago
9 Weirton Steel Co., Weirton, W. Va.
10 National Tube Co., Pittsburgh
11 Tennessee Coal, Iron & R. R. Co., Birmingham
12 Great Lakes Steel Corp., Detroit
13 Sharon Steel Corp., Sharon, Pa.
14 Colorado Fuel & Iron Corp., Denver
15 Wheeling Steel Corp., Wheeling, W. Va.
16 Geneva Steel Co., Salt Lake City
17 Crucible Steel Co. of America, New York
18 Pittsburgh Steel Co., Pittsburgh
19 Kaiser Steel Corp., Oakland, Calif.
20 Portsmouth Div., Detroit Steel Corp., Detroit
21 Lukens Steel Co., Coatesville, Pa.
22 Granite City Steel Co., Granite City, Ill.
23 Wisconsin Steel Co., South Chicago, Ill.
24 Columbia Steel Co., San Francisco
25 Copperweld Steel Co., Glassport, Pa.
26 Alan Wood Steel Co., Conshohocken, Pa.
27 Calif. Cold Rolled Steel Corp., Los Angeles
28 Allegheny Ludlum Steel Corp., Pittsburgh
29 Worth Steel Co., Claymont, Del.
30 Continental Steel Corp., Kokomo, Ind.
31 Rotary Electric Steel Co., Detroit
32 Laclede Steel Co., St. Louis
33 Northwestern Steel & Wire Co., Sterling, Ill.
34 Keystone Steel & Wire Co., Peoria, Ill.
35 Central Iron & Steel Co., Harrisburg, Pa.
36 Carpenter Steel Co., Reading, Pa.
37 Eastern Stainless Steel Corp., Baltimore
38 Washington Steel Corp., Washington, Pa.
39 Jessop Steel Co., Washington, Pa.
40 Blair Strip Steel Co., New Castle, Pa.
41 Superior Steel Corp., Carnegie, Pa.
42 Timken Steel & Tube Div., Canton, Ohio*
43 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
44 Reeves Steel & Mfg. Co., Dover, Ohio
45 John A. Roebling's Sons Co., Trenton, N. J.
46 Simonds Saw & Steel Co., Fitchburg, Mass.
47 McLouth Steel Corp., Detroit
48 Cold Metal Products Co., Youngstown
49 Thomas Steel Co., Warren, Ohio
50 Wilson Steel & Wire Co., Chicago
51 Sweet's Steel Co., Williamsport, Pa.
52 Superior Drawn Steel Co., Monaca, Pa.
53 Tremont Nail Co., Wareham, Mass.
54 Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
55 Ingersoll Steel Div., Chicago
56 Phoenix Iron & Steel Co., Phoenixville, Pa.
57 Fitzsimmons Steel Co., Youngstown
58 Stanley Works, New Britain, Conn.
59 Universal-Cyclops Steel Corp., Bridgeville, Pa.
60 American Cladmetals Co., Carnegie, Pa.
61 Cuyahoga Steel & Wire Co., Cleveland
62 Bethlehem Pacific Coast Steel Corp., San Francisco
63 Follansbee Steel Corp., Pittsburgh
64 Niles Rolling Mill Co., Niles, Ohio
65 Atlantic Steel Co., Atlanta
66 Acme Steel Co., Chicago
67 Joslyn Mfg. & Supply Co., Chicago
68 Detroit Steel Corp., Detroit
69 Wyckoff Steel Co., Pittsburgh
70 Bliss & Laughlin, Inc., Harvey, Ill.
71 Columbia Steel & Shafting Co., Pittsburgh
72 Cumberland Steel Co., Cumberland, Md.
73 La Salle Steel Co., Chicago
74 Monarch Steel Co., Inc., Hammond, Ind.
75 Empire Steel Co., Mansfield, Ohio
76 Mahoning Valley Steel Co., Niles, Ohio
77 Oliver Iron & Steel Co., Pittsburgh
78 Pittsburgh Screw & Bolt Co., Pittsburgh
79 Standard Forging Corp., Chicago
80 Driver Harris Co., Harrison, N. J.
81 Detroit Tube & Steel Div., Detroit
82 Reliance Div., Eaton Mfg. Co., Massillon, Ohio
83 Sheffield Steel Corp., Kansas City
84 Plymouth Steel Co., Detroit
85 Wickwire Spencer Steel, Buffalo
86 Angell Nail and Chaplet, Cleveland
87 Mid-States Steel & Wire, Crawfordsville, Ind.

*Add 10 pct to quoted prices

STAINLESS STEELS

Base prices, in cents per pound, f.o.b. producing point

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	13.75	14.50	16.00	15.50	23.75	19.25	21.00	12.25	14.25	12.50
Slabs, billets, rerolling	18.00	19.25	21.25	20.25	31.25	25.50	27.75	16.50	19.50	16.25
Forg. discs, die blocks, rings	32.00	32.00	34.50	33.50	50.50	38.00	42.50	29.00	26.50	26.50
Billets, forging	25.75	25.75	27.75	27.00	40.50	30.50	34.25	21.00	21.50	21.50
Bars, wire, structurals	30.00	30.00	32.50	31.50	47.50	35.50	40.00	24.50	25.00	25.00
Plates	32.00	32.00	34.00	34.00	50.50	39.50	44.00	28.00	26.50-27.00	26.50
Sheets	39.00	39.00	41.00	41.00	54.50	47.00	51.50	34.50	35.00	37.00
Strip, hot-rolled	25.50	27.00	31.25	29.00	47.25	35.75	40.00	22.50	29.25	23.00
Strip, cold-rolled	32.00	34.50	38.00	36.50	56.50	48.00	50.00	28.50	35.00	29.00

STAINLESS STEEL PRODUCING POINTS—*Sheets:* Midland, Pa., 17; Brackenridge, Pa., 28; Butler, Pa., 7; McKeesport, Pa., 1; Washington, Pa., 38 (add 5¢), 39; Baltimore, 37; Middletown, Ohio, 7; Massillon, Ohio, 4; Gary, 1; Bridgeville, Pa., 59; New Castle, Ind., 55; Ft. Wayne, Ind., 67; Lockport, N. Y., 46.

Strip: Midland, Pa., 17; Cleveland, 2; Carnegie, Pa., 41; McKeesport, Pa., 54; Reading, Pa., 36; Washington, Pa., 38 (add 5¢); W. Leechburg, Pa., 28; Bridgeville, Pa., 59; Detroit, 47; Massillon, Canton, Ohio, 4; Middletown, Ohio, 7; Harrison, N. J., 80; Youngstown, 48; Lockport, N. Y., 46; New Britain, Conn., 58; Sharon, 13; Butler, Pa., 7.

Bars: Baltimore, 7; Duquesne, Pa., 1; Munhall, Pa., 1; Reading, Pa., 36; Titusville, Pa., 59; Washington, Pa., 39; McKeesport, Pa., 1, 54; Bridgeville, Pa., 59; Dunkirk, N. Y., 28; Massillon, Ohio, 4; Chicago, 1; Syracuse, N. Y., 17; Watervliet, N. Y., 28; Waukegan, Ill., 2; Lockport, N. Y., 46; Canton, Ohio, 42; *Ft. Worth, Ind., 67.

Wire: Waukegan, Ill., 2; Massillon, Ohio, 4; McKeesport, Pa., 54; Bridgeport, Conn., 44; Ft. Wayne, Ind., 67; Trenton, N. J., 45; Harrison, N. J., 80; Baltimore, 7; Dunkirk, 28.

Structurals: Baltimore, 7; Massillon, Ohio, 4; Chicago, 1, 67; Watervliet, N. Y., 28; Bridgeport, Conn., 44.

Plates: Brackenridge, Pa., 28; Butler, Pa., 7; Chicago, 1; Munhall, Pa., 1; Midland, Pa., 17; New Castle, Ind., 55; Lockport, N. Y., 46; Middletown, 7; Washington, Pa., 39; Cleveland, Massillon, 4.

Forged discs, die blocks, rings: Pittsburgh, 1, 17; Syracuse, 17; Ferndale, Mich., 28.

Forging billets: Midland, Pa., 17; Baltimore, 7; Washington, Pa., 39; McKeesport, 54; Massillon, Canton, Ohio, 4; Watervliet, 28; Pittsburgh, Chicago, 1.

* Add 10 pct to quoted prices.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Base Col.	Woven Wire Fence 9-15½ ga. Base Col.	Fence Posts Base Col.	Single Loop Bale Ties Base Col.	Twisted Barbless Wire Base Col.	Galv. Barbed Wire Base Col.	Merch. Wire Ann'ld. ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City-4	106	116	....	113	126	126	5.35	5.60
Aliquippa, Pa.-5	106	120	....	....	126	130	5.35	5.60
Atlanta-65	113	123	....	119	126	133	5.70	5.95
Bartonville-34	106	116	....	113	126	126	5.35	5.60
Buffalo-85	....	....	....	....	....	....	4.50	....
Chicago-4	106	116	....	113	126	126	....	....
Cleveland-86	111	....	....	....	....	....	....	....
Cleveland-2	....	....	....	....	....	....	5.35	5.60
Crawfordsville-87	112	123	....	120	....	135	5.45	5.95
Donora, Pa.-2	106	120	....	113	126	130	5.35	5.60
Duluth-2	106	120	116	113	126	130	5.35	5.60
Fairfield, Ala.-11	106	120	....	113	126	130	5.35	5.60
Houston-83	114	124	....	....	126	134	5.75	6.00
Johnstown, Pa.-3	106	120	125	....	126	130	5.35	5.60
Joliet, Ill.-2	106	114	116	113	126	130	5.35	5.60
Kokomo, Ind.-30	112	123	....	120	126	135	5.70	5.95
Los Angeles-62	....	....	....	....	....	....	6.30	....
Kansas City-83	118	128	....	125	126	138	5.95	6.20
Minnequa-14	111	128	121	118	126	138	5.60	6.10
Monessen-18	112	123	....	....	126	133	5.60	5.85
Moline, Ill.-4	....	....	112	....	....	....	....	....
Palmer-85	....	....	....	....	....	....	4.80	....
Pittsburg, Cal.-24	125	143	....	137	148	150	6.30	6.45
Portsmouth-20	106	116	....	113	126	126	5.35	5.60
Rankin, Pa.-2	106	120	....	....	126	130	5.35	5.60
San Francisco-14	....	....	....	....	....	....	....	....
So. Chicago, Ill.-4	106	116	116	113	....	126	5.35	5.60
So. San Francisco-14	....	....	....	137	....	151	6.30	6.60
Sparrows Pt.-3	108	....	....	115	126	132	5.45	5.90
Sterling, Ill.-33	112	118	....	119	126	133	5.65	5.85
Struthers, Ohio-6	....	....	....	....	....	....	5.35	5.60
Torrance, Cal.-24	126	....	....	....	....	....	6.30	....
Worcester-2	112	....	....	....	....	....	5.85	6.10
Williamsport, Pa.-51	....	....	130	....	....	....	....	....

Cut Nails, carloads, base $6.75 per 100 lb, (less 20¢ to jobbers) at Conshohocken, Pa., (26), Wareham, Mass., (53) Wheeling, W. Va., (15).

BOILER TUBES

Seamless steel, electric welded commercial boiler tubes, locomotive tubes, minimum wall, per 100 ft at mill, o.l. lots, cut lengths 10 to 24 ft.

OD gage in in.	BWG	Seamless H.R.	Seamless C.R.	Electric Weld H.R.	Electric Weld C.D.
2	13	$20.61	$24.24	$19.99	23.51
2½	12	27.71	32.58	26.88	31.60
3	12	30.82	36.27	29.90	35.18
3½	11	38.52	45.35	37.36	43.99
4	10	47.82	56.25	46.39	54.56

Pittsburgh Steel add, H-R: 2 in., 62¢; 2½ in., 84¢; 3 in., 92¢; 3½ in., $1.17; 4 in., $1.45. Add, C-R: 2 in., 74¢; 2½ in., 99¢; 3 in., $1.10; 3½ in., $1.37; 4 in., $1.70.

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb	$3.40
Joint bars, per 100 lb	4.40
Light rails, per 100 lb	3.75
Base Price cents per lb	
Track spikes†	5.60
Axles	5.25
Screw spikes	8.60
Tie plates	4.20
Pittsburg, Torr., Calif.; Seattle	4.35
Track bolts, untreated	8.85
Track bolts, heat treated, to railroads	9.10

†Kansas City, 5.85¢.

PRODUCING POINTS—*Standard rails:* Bessemer, Pa., 1; Ensley, Ala., 11; Gary, 1; Indiana Harbor, Ind., 8; Lackawanna, N. Y., 3; Minnequa, Colo., 14; Steelton, 3.

Light rails: All the above except Indiana Harbor and Steelton, plus Fairfield, Ala., 11; Johnstown, 3; Minnequa, 14.

Joint bars: Bessemer, Pa., 1; Fairfield, Ala., 11; Indiana Harbor, Ind., 8; Joliet, Ill., 1; Lackawanna, N. Y., 3; Steelton, Pa., 3; Minnequa, Colo., 14.

Track spikes: Indiana Harbor, Ind., 6, 8; Lebanon, Pa., 3; Minnequa, Colo., 14; Pittsburgh, 5; Chicago, 4; Struthers, 6; Youngstown, 4.

Track bolts: Lebanon, Pa., 3; Minnequa, Colo., 14; Pittsburgh, 77, 78.

Axles: Indiana Harbor, Ind., 79; Johnstown, Pa., 3.

Tie plates: Fairfield, Ala., 11; Gary, 1; Indiana Harbor, Ind., 8; Lackawanna, N. Y., 3; Pittsburg, Calif., 24; Seattle, 62; Steelton, Pa., 3; Torrance, Calif., 24; Minneona, Colo., 14.

Numbers after producing points correspond to steel producers. See key on Steel Price page.

PIPE AND TUBING

Base discounts, f.o.b. mills
Base price about $200.00 per net ton

Standard, T & C

	Black	Galv
Steel, Buttweld*		
⅛-in.	40½ to 38½	21 to 18½
¼-in.	43½ to 41½	25 to 21½
1-in.	46 to 44	28 to 22
1¼-in.	46½ to 44½	28½ to 23
1½-in.	47 to 45	29 to 23½
2-in.	47½ to 45½	29½ to 24
2½ to 3-in.	48 to 46	30 to 27
Steel, Lapweld		
2-in.	38	16½
2½ to 3-in.	42	31
3½ to 6-in.	43 to 40	22 to 21½
Steel, seamless		
2-in.	36	17½ to 14½
2½ to 3-in.	39	20½ to 18
3½ to 6-in.	41	22½ to 20
Wrought iron, buttweld		
⅛-in.	+26½	+58½
¼-in.	+16½	+47½
1 & 1¼-in.	+10½	+38½
1½-in.	+ 4½	+35
2-in.	+ 4	+34½
Wrought iron, lapweld		
2-in.	+13½	+42½
2½ to 3½-in.	+11	+38
4-in.	+ 6	+32
4½ to 8-in.	+ 8	+33½
9 to 12-in.	+18	+43

Extra Strong, Plain Ends

Steel, buttweld		
⅛-in.	39½ to 37½	21½ to 17½
¼-in.	43½ to 41½	25½ to 21½
1-in.	45½ to 43½	28½ to 23½
1¼-in.	46 to 44	29 to 24½
1½-in.	46½ to 44½	29½ to 25
2-in.	47 to 45	30 to 25½
2½ to 3-in.	47½ to 45½	30½ to 23½
Steel, lapweld		
2-in.	37	15½
2½ to 3-in.	42	21
3½ to 6-in.	44½ to 41½	23½ to 24
Steel, seamless		
2-in.	35	17½ to 14½
2½ to 3-in.	38	21½ to 18
3½ to 6-in.	42½	25 to 20
Wrought iron, buttweld		
⅛-in.	+22	+52½
¼-in.	+15½	+45½
1 to 2-in.	+ 5½	+34½
Wrought iron, lapweld		
2-in.	+10½	+39
2½ to 4-in.	+ 1	+27½
4½ to 6-in.	+ 5	+32
7 & 8-in.	list	+27
9 to 12-in.	+11½	+35

Threads only, butt, lapweld and seamless pipe, 1 pt higher disc. (lower price). Plain ends, butt, lapweld and seamless, 3 in. & under, 3 pts higher disc. Lapweld, seamless 3½ in. & over, 4 pt higher disc. Buttweld & lapweld steel pipe, jobbers disc. 5 pct.

*Fontana, Calif., deduct 11 pts from left col.; galv., deduct 14 to 13 pts. Bethlehem, Youngstown, add average $3.80 per ton on galv. Republic Steel, galv., add $5 per ton for ⅛ to ¾ in.; $4 per ton for 1 to 1¼ in.; $3 per ton for 1½ to 12 in.

ELECTRICAL SHEETS

22 gage, HR cut lengths, f.o.b. mill

	Cents per lb.
Armature	*6.30
Electrical	*6.70
Motor	*7.95
Dynamo	8.75
Transformer 72	9.30
Transformer 65	9.85
Transformer 58	10.55
Transformer 52	11.35

PRODUCING POINTS—Beech Bottom, W. Va., 15; Brackenridge, Pa., 28; Follansbee, W. Va., 63; Granite City, Ill., 22*, add 70¢; Indiana Harbor, Ind., 8; Mansfield, Ohio, 75; Niles, Ohio, 64, add 30¢; Vandergrift, Pa., 1; Warren, Ohio, 4; Zanesville, Ohio, 7.

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb. (Metropolitan area delivery, add 20¢ to base price except Birmingham, San Francisco, Cincinnati, New Orleans, St. Paul (°), add 15¢; Philadelphia, add 25¢; Chicago, add 30¢).

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140 Ann.
Baltimore	5.15	6.39[1]	6.55[2] 6.65	5.59–5.59[11]	....	5.40–6.04[11]	5.69	5.59	6.19	9.69	9.99	11.12	11.49
Birmingham°	5.15[10]	5.95	6.15[7]	5.10	....	5.55	5.25	5.10	5.88	....	....	....	....
Boston	5.75	6.55[20]	6.84[3] 7.14	5.70	6.90–6.95	6.08	5.75	5.60	6.19–6.69	9.70–9.97	9.50–10.00	11.15	11.49
Buffalo	5.15	5.95	6.04	5.41	7.27	5.85	5.35	5.15	5.75	9.60	9.90	11.05	11.39
Chicago°	5.15	6.20	6.05	5.10	6.30	5.40	5.25	5.10	5.85	9.25	9.55	10.70	11.00
Cincinnati°	5.42–5.97	5.99–6.24	6.39	5.35	....	5.79	5.64	5.35–5.54	5.95–6.25	9.60–9.81	9.90–10.11	11.05–11.28	11.35–11.56
Cleveland	5.15	5.95	7.00–7.10	5.24	6.35	5.52	5.37	5.12	5.75	9.38	9.66	10.81	11.11
Detroit	5.33	6.08–6.33	7.09	5.49	6.45–6.80	5.89	5.64–5.66	5.39	5.91	9.58	9.86	11.01	11.31
Houston	6.00	....	....	6.10	....	6.00	5.95	6.10	7.80	10.35–10.45	10.50–10.60	11.50	11.95–12.10
Indianapolis	....	....	....	....	7.36	....	....	....	6.15	....	....	....	....
Kansas City	5.75	6.55[20]	7.55	5.70	6.95	6.00	5.85	5.70	6.35	9.85	10.15	11.30	11.60
Los Angeles	5.90	7.45	7.70[3]	5.95	8.70[16]	6.00	5.90	5.90	7.55	10.75	10.75	12.45	12.75
Memphis	5.93	6.68	....	5.98	6.80–8.51	6.08	5.93	5.68	6.51	....	....	....	....
Milwaukee	5.29	6.09	6.94–6.99	5.24	6.32	5.54	5.39	5.24	5.89	9.39	9.69	10.84	11.14
New Orleans°	5.50[1]	6.75 6.85[1]	....	5.55[1]	6.90 6.90[1]	6.65	5.55[1]	5.55[1]	6.75 6.80	....	....	....	....
New York	5.52	6.64	7.54[2]	5.84	6.76	5.88	5.68	5.67	6.44	9.60	9.90	11.05	11.39
Norfolk	6.10[13]	7.00	....	6.30[13]	....	6.15[13]	6.20[13]	6.15[13]	7.20[13]	....	....	....	....
Philadelphia°	6.05	6.20–6.35	6.85[3] 7.25	5.85	6.29	5.65	5.45	5.60	6.21	9.35	9.65	10.80	11.10
Pittsburgh	5.15	5.95	6.60	5.20	5.95–6.00	5.35	5.25	5.10	5.75	9.25	9.55	10.70	11.00
Portland	6.60–7.10[1]	8.40[3]	....	6.85[9]	....	6.40[9]	6.50	6.45–6.45[9]	8.60[14]	12.00[18]	11.60[18]	....	....
Salt Lake City	5.85	6.70	....	7.45	8.75	6.10[3]	5.90	7.35[3]	8.75	....	....	....	....
San Francisco°	6.20	7.60[3]	7.75[3]	6.15	7.85[16]	6.10	6.00	6.00	7.55	10.75	10.75	12.45	12.75
Seattle	6.60[4]	8.15[3]	8.40[3]	6.85[4]	....	6.35[4]	6.20[4]	6.35[4]	8.50[14]	....	11.60[18]	....	13.60[19]
St. Louis	5.48	6.28	7.18	5.43	7.30	5.73	5.58	5.43	6.08	9.58	9.88	11.03	11.33
St. Paul°	5.71	6.51	7.41	5.66	6.16–6.82	5.96	5.81	5.66	6.31	9.81	10.11	11.26	11.56

BASE QUANTITIES (*Standard unless otherwise keyed on prices.*)
Hot-rolled sheets and strip, hot rolled bars and bar shapes, structural shapes, plate, galvanized sheets and cold-rolled sheets; 2000 to 9999 lb. Cold-finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb.

All HR products may be combined to determine quantity bracket. All galvanized sheets may be combined to determine quantity bracket. CR sheets may not be combined with each other or with galv. sheets to determine quantity bracket.

Exceptions:
(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 to 5999 lb; (6) 1000 lb and over; (7) 500 to 1499 lb; (8) 400 lb and over; (9) 400 to 9999 lb; (10) 500 to 9999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 9999 lb; (16) 6000 lb and over; (17) up to 1999 lb; (18) 1000 to 4999 lb; (19) 1500 to 3499 lb; (20) CR sheets may be combined for quantity; (21) 3 to 24 bundles.

PIG IRON PRICES

Dollars per gross ton. Delivered prices do not include 3 pct tax on freight.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	51.00	51.50	52.00	52.50	.....
Birmingham	45.38	45.88	.....	.....	.....
Buffalo	49.00	49.50	50.00	.....	.....
Chicago	49.00	49.50	49.50	50.00	.....
Cleveland	49.00	49.50	49.50	50.00	54.00
Coingerfield, Tex.	45.00	45.50	45.50	.....	.....
Duluth	49.00	49.50	49.50	50.00	.....
Erie	49.00	49.50	49.50	50.00	.....
Everett	.....	52.25	52.75	.....	.....
Fontana	55.00	55.50	.....	.....	.....
Granite City	50.90	51.40	51.90	.....	.....
Ironton, Utah	46.00	46.50	.....	.....	.....
Pittsburgh	49.00°	.....	.....	50.00	.....
Neville Island	49.00	49.50	49.50	50.00	.....
Geneva, Utah	49.00	49.50	.....	.....	.....
Sharpsville	49.00	49.50	49.50	50.00	.....
Steelton	51.00	51.50	52.00	52.50	57.00
Swedeland	53.00	53.50	54.00	54.50	.....
Toledo	49.00	49.50	49.50	50.00	.....
Troy, N. Y.	51.00	51.50	52.00	.....	57.00
Youngstown	49.00	49.50	49.50	50.00	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Producing Point	Rail Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$.60–.80	.....	52.85–53.05	53.55–53.75	.....	.....
Boston	Steelton	6.90	.....	.....	.....	.....	60.90
Brooklyn	Bethlehem	4.29	.....	52.79	53.29	53.79	.....
Cincinnati	Birmingham	6.70	52.08	52.58	.....	.....	.....
Jersey City	Bethlehem	2.63	.....	51.13	51.63	52.13	.....
Los Angeles	Geneva-Ironton	7.70	56.70	57.20	.....	.....	.....
Los Angeles	Fontana	.....	56.70	57.20	.....	.....	.....
Mansfield	Toledo-Cleveland	3.33	49.33	49.83	49.83	50.33	54.33
Philadelphia	Bethlehem	2.39	53.39	53.89	54.39	54.89	.....
Philadelphia	Swedeland	1.44	54.44	54.94	55.44	55.94	.....
Philadelphia	Steelton	3.09	54.09	54.59	55.09	55.59	60.09
Rochester	Buffalo	2.63	51.63	52.13	52.63	.....	.....
San Francisco	Geneva-Ironton	7.70	56.70	57.20	.....	.....	.....
San Francisco	Fontana	.....	56.70	57.20	.....	.....	.....
Seattle	Geneva-Ironton	7.70	53.70	54.20	.....	.....	.....
Seattle	Fontana	7.70	56.70	57.20	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	48.65	49.15	49.65	.....	.....
Syracuse	Buffalo	3.58	52.58	53.08	53.58	.....	.....

° *Monessen, $51.00.*

Producing point prices are subject to switching charges; silicon differential (not to exceed 50c per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 38c per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50c per ton for each 0.50 pct manganese content in excess of 1.00 pct, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.01 to 6.50 pct C/L per g.t., f.o.b. Jackson, Ohio—$59.50; f.o.b. Buffalo, $60.75. Add $1.50 per ton for each additional 0.50 pct Si up to 17 pct. Add 50c per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $62.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $70.56. High phosphorus charcoal pig iron is not being produced.

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

	Pct Off List Less Case	C.
½ in. & smaller x 6 in. & shorter	23	35
9/16 in. & ⅝ in. x 6 in. & shorter	26	37
¾ in. & larger x 6 in. & shorter	26	37
All diam. longer than 6 in.	22	34
Lag, all diam. x 6 in. & shorter	30	41
Lag, all diam. longer than 6 in.	28	39
Plow bolts	40	—

Nuts, Hot Pressed, Cold Punched—Sq

	Pct Off List Less Keg K. (Reg)		Less Keg K. (Hvy)	
½ in. & smaller	23	35	23	35
9/16 in. & ⅝ in.	20	32	15	28
¾ in. to 1½ in. inclusive	23	35	10	24
1⅝ in. & larger	16	29	10	24

Nuts, Hot Pressed—Hexagon

½ in. & smaller	33	43	29	40
9/16 in. & ⅝ in.	24	36	15	28
¾ in. to 1½ in. inclusive	20	32	11	25
1⅝ in. & larger	17	30	11	25

Nuts, Cold Punched—Hexagon

½ in. & smaller	33	43	29	40
9/16 in. & ⅝ in.	30	41	25	37
¾ in. to 1½ in. inclusive	27	38	20	32
1⅝ in. & larger	20	32	15	28

Nuts, Semi-Finished—Hexagon

	Reg		Hvy	
½ in. & smaller	41	50	35	45
9/16 in. & ⅝ in.	36	46	29	40
¾ in. to 1½ in. inclusive	31	42	23	35
1⅝ in. & larger	21	33	17	30
	Light			
7/16 in. & smaller	41	50		
½ in. thru ⅝ in.	35	45		
¾ in. to 1½ in. inclusive	33	43		

Broken case or keg add 15 pct.

Stove Bolts

	Pct Off List
Packaged, steel, plain finished	56—10
Packaged, plated finish	41—10
Bulk, plain finish**	67*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets

	Base per 100 lb
½ in. & larger	$7.25
	Pct Off List
7/16 in. & smaller	43

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham, Lebanon, Pa.

Cap and Set Screws

(In bulk)	Pct Off List
Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright	58
¾ in. thru 1 in. up to & including 6 in.	53
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat	51
⅝ in. thru 1 in. up to & including 6 in.	46
Milled studs	33
Flat head cap screws, listed sizes	24
Fillister head cap, listed sizes	43
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	57

LAKE SUPERIOR ORES

(51.50% Fe: natural content, delivered lower lake ports)

	Per gross ton
Old range, bessemer	$8.10
Old range, nonbessemer	7.95
Mesabi, bessemer	7.85
Mesabi, nonbessemer	7.70
High phosphorus	7.70

After Jan. 25, 1950, increases or decreases in Upper Lake rail freight, dock handling charges and taxes are for buyers' account.

ELECTRODES

Cents per lb, f.o.b. plant, threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb
	GRAPHITE	
17, 18, 20	60, 72	17.00¢
8 to 16	48, 60, 72	17.00¢
7	48, 60	18.64¢
6	48, 60	19.95¢
4, 5	40	20.48¢
3	40	21.53¢
2½	24, 30	22.05¢
2	24, 30	24.15¢
	CARBON	
40	100, 110	7.65¢
35	65, 110	7.65¢
30	65, 84, 110	7.65¢
24	72 to 104	7.65¢
20	84, 90	7.65¢
17	60, 72	7.65¢
14	60, 72	8.16¢
10, 12	60	8.42¢
8	60	8.67¢

CLAD STEEL

Base prices, cents per pound, f.o.b. mill

Stainless-carbon	Plate	Sheet
No. 304, 20 pct,		
Coatesville, Pa. (21)	*28.00	
Washgtn, Pa, (39)	*28.00	
Claymont, Del. (29)	*28.00	
Conshohocken, Pa. (26)		*24.00
New Castle, Ind. (55)	*26.50	*25.50
Nickel-carbon		
10 pct, Coatesville (21)	31.00	
Inconel-carbon		
10 pct, Coatesville (21)	39.00	
Monel-carbon		
10 pct, Coatesville (21)	32.00	
No. 302 Stainless-copper-stainless, Carnegie, Pa. (60)		77.00
Aluminized steel sheets, hot dip, Butler, Pa. (7)		7.75

*Includes annealing and pickling, or sandblasting.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.00
18	4	1	—	5	$1.565
18	4	2	—	—	$1.13
1.5	4	1.5	8	—	71.5¢
6	4	2	6	—	76.5¢

High-carbon-chromium	57.5¢
Oil hardened manganese	32¢
Special carbon	29.5¢
Extra carbon	24.5¢
Regular carbon	21¢

Warehouse prices on and east of Mississippi are 3¢ per lb higher. West of Mississippi, 5¢ higher.

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon	4.50¢
0.41 to 0.60 carbon	5.95¢
0.61 to 0.80 carbon	6.55¢
0.81 to 1.05 carbon	8.50¢
1.06 to 1.35 carbon	10.80¢

Worcester, add 0.30¢; Sharon, New Britain, Carnegie, New Castle, add 0.35¢; Detroit, 0.26 to 0.40 carb., add 60¢; other grades add 20¢. New Haven, 0.26 to 0.40 carb., add 85¢; other grades add 30¢.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$14.00 to $14.50
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	$16.50 to $17.00
Foundry, oven coke	
Buffalo, del'd	$25.35
Chicago, f.o.b.	21.00
Detroit, f.o.b.	23.00
New England, del'd	24.30
Seaboard, N. J., f.o.b.	22.00
Philadelphia, f.o.b.	22.10
Swedeland, Pa., f.o.b.	22.00
Plainesville, Ohio, f.o.b.	23.25
Erie, del'd	$22.29 to 22.50
Cleveland, del'd	22.62
Cincinnati, del'd	22.71
St. Paul, f.o.b.	21.00
St. Louis, f.o.b.	24.90
Birmingham, del'd	20.79

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill. Base price, per ton net: Effective CaF, content:

70% or more	$41.00
60% or less	38.00

REFRACTORIES

Fire Clay Brick *(F.o.b. works) Carloads, Per 1000*

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5)	$94.60
No. 1 Ohio	88.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	8.00
No. 2 Ohio	79.20
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	13.75

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$94.60
Childs, Pa.	99.00
Hays, Pa.	100.10
Chicago District	104.50
Western Utah and Calif.	111.10
Super Duty, Hays, Pa., Athens, Tex., Chicago	111.10
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	16.50
Silica cement, net ton, bulk, Hays, Pa.	18.70
Silica cement, net ton, bulk, Ensley, Ala.	17.60
Silica cement, net ton, bulk, Chicago District	17.60
Silica cement, net ton, bulk, Utah and Calif.	24.75

Chrome Brick *Per Net Ton*

Standard chemically bonded, Balt., Chester	$77.00

Magnesite Brick

Standard, Baltimore	$99.00
Chemically bonded, Baltimore	88.30

Grain Magnesite *St. ⅜-in. grain*

Domestic, f.o.b. Baltimore, in bulk fines removed	$62.70
Domestic, f.o.b. Chewelah, Wash., in bulk	36.30
in sacks	41.80

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk Midwest, add 10¢; Missouri Valley, add 20¢	$13.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.4¢ to 9.0¢
Canadian sponge iron, del'd, in East	10.00¢
Domestic sponge iron, 98+% Fe, carload lots	9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe	36.0¢ to 39.5¢
Electrolytic iron unannealed, minus 325 mesh, 99+% Fe	48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe	70.0¢ to $1.35
Aluminum	29.00¢
Brass, 10 ton lots	30.00¢ to 33.25¢
Copper, electrolytic 10.25¢ plus metal value	
Copper, reduced	10.00¢ plus metal value
Cadmium 100-199 lb.	95¢ plus metal value
Chromium, electrolytic, 99% min., and quantity	$3.50
Lead	6.5¢ plus metal value
Manganese	52.00¢
Molybdenum, 99%	$2.65
Nickel, unannealed	75.5¢
Nickel, annealed	81.5¢
Nickel, spherical, unannealed	78.5¢
Silicon	34.00¢
Solder powder	6.5¢ to 8.5¢ plus met. value
Stainless steel, 302	75.00¢
Tin	11.00¢ plus metal value
Tungsten, 99%	$3.40
Zinc, 10 ton lots	20.50¢ to 23.85¢

CAST IRON WATER PIPE

Per net ton

6 to 24-in., del'd Chicago	$95.30 to $98.80
6 to 24-in., del'd N. Y.	94.50 to 95.50
6 to 24-in., Birmingham	$81.50 to 86.00

6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less $103.50 to $113.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

(Prices continued on p. 110)

FERROALLOYS

Ferromanganese
78-82% Mn. maximum contract base price, gross ton, lump size.
F.o.b. Birmingham $174
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont., Ashtabula, O. $185
F.o.b. Johnstown, Pa. $187
F.o.b. Sheridan, Pa. $185
F.o.b. Etna, Clairton, Pa. $174
$2.00 for each 1% above 82% Mn penalty, $2.15 for each 1% below 78%.
Briquets—Cents per pound of briquet delivered, 66% contained Mn.
Carload, bulk 10.45
Ton lots 12.05

Spiegeleisen
Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$69.00	$70.00
Pgh. or Chicago	70.00	71.00

Manganese Metal
Contract basis, 2 in. x down, cents per pound of metal, delivered.
96% min. Mn, 0.2% max. C, 1% max Si, 2% max. Fe.
Carload, packed 29.75
Ton lots 31.25

Electrolytic Manganese
F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.
Carloads 28
Ton lots 30
Less ton lots 32

Medium Carbon Ferromanganese
Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb. of contained Mn .....19.15¢

Low-Carbon Ferromanganese
Contract price, cents per pound Mn contained, lump size, del'd., Mn. 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	26.25	28.10	29.30
0.07% max. C.....	25.75	27.60	28.80
0.15% max. C.....	25.25	27.10	28.30
0.30% max. C.....	24.75	26.60	27.80
0.50% max. C.....	24.25	26.10	27.30
0.75% max. C, 7.00% max. Si.....	21.25	23.10	24.30

Silicomanganese
Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.
Carload bulk 9.60
Ton lots 11.25
Briquet, contract basis carlots, bulk delivered, per lb of briquet..... 10.85
Ton lots 11.45

Silvery Iron (electric furnace)
Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $86.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $80.00. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50% Mn over 1%.

Silicon Metal
Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.
96% Si, 2% Fe..... 20.70
97% Si, 1% Fe..... 21.10

Silicon Briquets
Contract price, cents per pound of briquet bulk, delivered, 40% Si, 1 lb Si briquets.
Carload, bulk 6.75
Ton lots 8.35

Electric Ferrosilicon
Contract price, cents per pound contained Si, lump, bulk, carloads, delivered.
25% Si..... 18.00 75% Si..... 14.30
50% Si..... 12.00 85% Si..... 15.55
90-95% Si 17.50

Calcium Metal
Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots..	2.40	3.30	4.55

(Prices Continued on Page 115)

STRIKE?

no..they're out because of a broken bolt!

You're looking at a group of production workers who have been laid off temporarily—because a certain bolt in an all-important drive corroded to failure.

One of the most regrettable aspects of this situation is that it *could* have been avoided... by specifying non-ferrous or stainless steel fastenings at the time the equipment was purchased; or by replacing common steel fastenings *on delivery* with bolts, nuts, screws, rivets and accessories that *resist* corrosion.

Harper specializes in these Everlasting Fastenings; makes them in over 7000 different sizes, types and alloys—Brass, Bronzes, Copper, Monel and Stainless Steels. Large quantities are maintained in stock for immediate delivery to manufacturers everywhere who know by experience the extra qualities you get in Harper fastenings—better appearance, longer life, ease of cleaning and resistance to high temperatures. They're most economical in the long run.

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HARPER

EVERLASTING FASTENINGS

Other Ferroalloys

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.
- Carload ..... 8.15¢
- Ton lots ..... 9.55¢

Calcium molybdate, 45-40%, f.o.b. Langeloth, Pa., per pound contained Mo $1.05

Ferrocolumbium, 50-60%, 2 in x D, contract basis, delivered, per pound contained Cb.
- Ton lots $4.90
- Less ton lots 4.95

Ferro-Tantalum-columbium, 20% Ta, 40% Cb, 0.30 C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta $3.75

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo $1.22

Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton $65.00
10 tons to less carload 75.00

Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.55

Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $177.00

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered $2.50

Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained V.
- Openhearth ..... $3.00-$3.05
- Crucible 3.10- 3.15

High speed steel (Primos) 3.25

Molybdic oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa. $1.04
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.03

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
- Carload, bulk, lump ..... 11.00¢
- Ton lots, bulk lump ..... 11.50¢
- Less ton lots, lump ..... 12.25¢

Vanadium pentoxide, 88-92% V_2O_5, contract basis, per pound contained V_2O_5 ..... $1.28

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
- Ton lots ..... 21.00¢

Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.
- Carload, bulk ..... 7.00¢

Boron Agents

Contract prices per lb of alloy, del.

Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B $4.25

Bortam, f.o.b. Niagara Falls
- Ton lots, per pound ..... 45¢
- Less ton lots, per pound ..... 50¢

Carbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.
- Ton lots, per pound ..... 10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots $1.20
F.o.b. Wash., Pa.; 100 lb, up
- 10 to 14% B ..... .75
- 14 to 19% B 1.20
- 19% min. B 1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.
- No. 1 ..... $1.00
- No. 6 ..... 63¢
- No. 79 ..... 50¢

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.
- Ton lots $1.46
- Less ton lots 1.57

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.
- Less ton lots $1.80

Silcaz, contract basis, delivered.
- Ton lots ..... 45.00¢

The Clearing House

NEWS OF USED, REBUILT AND SURPLUS MACHINERY

Air Force Machines—Certain machine tools now held in reserve by the Air Force may soon be released. An effort will be made to release some of the single-purpose tools, no longer needed, from the reserve. These are to be exchanged for types of tools which are needed, or sold to provide money to buy other tools. Dealers may obtain information from Wright-Patterson Air Force Base, Attn: MCPIXR, Dayton, Ohio.

New Location—The W. C. Cowden Machinery Co., Syracuse, N. Y., has acquired a large space in downtown Syracuse for office and warehouse purposes. The company deals in used and rebuilt industrial equipment.

NISA Meeting—Dale Bennett, asst. superintendent of production, Acme Steel Co., was the featured speaker at the November 13 meeting of the Central District NISA in Chicago. His topic was "Taxes and Icebergs," a talk comparing taxes with icebergs, only a small part of whose total bulk is visible above the surface. H. Ed. Grant, NISA president, gave a short talk at this meeting. The group's next meeting will be held at the Electric Club in Chicago, December 12.

Behind the DO—As yet, there have been no reports of used machinery sales under the DO priority system. However, many dealers want to familiarize themselves with the DO system, just in case. Many report confusion over the flood of regulations governing DO priorities which has come from Washington.

In general, machine tools, whether new or used, may not be purchased through use of DO priorities, since the regulations state that priorities are not for capital goods. There are, however, exceptions.

Except when a government department buys direct, none of the various DO numbers applies to machine tools. When someone with a government order needs a machine tool badly enough, the department which has placed the order may assign him a DO-21 priority, which can be used to purchase machine tools.

DO-21 is the only number which can be used for this purpose by a private firm, under present interpretations of the regulations.

What Numbers Mean—The number following the initials DO does not refer to the degree of priority of the order. All DO orders theoretically have equal priority. The numbers merely indicate the source and type of the order, such as: 01, aircraft; 07, electronics; 11, building supplies and equipment; and 22, Dept. of Defense construction.

N. Y. MDNA—The New York MDNA chapter will hold its November meeting at the warehouse of the S & S Machinery Co., Brooklyn. Since the date of the meeting, November 27, coincides with the opening of the National Power Show, an open invitation to attend this meeting has been extended to all MDNA members who may be in town for the show.

Those planning to attend the 6 p. m. dinner are requested to notify the S & S Machinery Co., 140 53 rd St., Brooklyn, in advance.

Defense Orders—Reports from Detroit, center of most of the increased defense buying so far, indicate that most business currently being done is by government contractors. Used machinery people have had little buying done directly by the government. This is welcome, as it means less of the red tape usually associated with government buying. Whether or not the government itself will ever buy used tools extensively is doubtful.